RUSSIAN CAPACITY TO DEVELOP ITS OFFSHORE HYDROCARBON RESOURCES IN THE KARA SEA: ARCTIC AND GLOBAL IMPLICATIONS

By

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Russian capacity to develop its offshore hydrocarbon resources in the Kara Sea: Arctic and global implications

Increasing seasonal ice free Arctic waters and market demand to expand hydrocarbon extraction to previously undeveloped offshore regions has accelerated an Arctic priority in national strategies and international forums. It is proposed that geo-strategically, the sheer size of the Kara Sea hydrocarbon fields is of a predictive magnitude great enough to impact the progression or regression of the Russian economy; and thereby have a predictive value on the capacity for Russian unilateral foreign policy decisions. Rosneft has released figures of a potential 30 to 40 billion barrels of recoverable undiscovered oil reserves in the South Kara Sea basin and significantly more in the more remote northern waters, representing the largest unexploited hydrocarbon potential remaining for the Russian Federation. There are also undercurrents of skepticism that the Russians may not achieve offshore production at the pace and or scale they envision. Though the direct economic contributions to the *global* economy of exploitation of Kara Sea hydrocarbons is likely not a game changer, the technological sophistication it will require and the level of cooperation and integration needed between the most advanced Western corporate techniques and Russian partners, could well be for Russian central state stability. In this context, hydrocarbon development in the Kara Sea region lends itself to interdisciplinary study as a means to assess Russia's relative strategic stability. The research incorporated two primary tools to assess the drivers impacting successful Russian hydrocarbon development of its Kara Sea resources. The first was a survey-interview of experts and the second was the creation of scenario narratives (assisted by a workshop of Arctic experts and stakeholders). The four scenarios were designed to explore the complexity of the interplay of the drivers of hydrocarbon development in the Kara Sea, with the objective, of identifying plausible future decision points for planners and policy makers.

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List of Acronyms

Arctic Marine Shipping Assessment (AMSA)

Arctic Council (AC)

Barents-Euro Arctic Council (BEAC)

Billion Barrels of Oil Equivalent (BBOE)

British Petroleum (BP)

Circum-Arctic Resource Appraisal (CARA)

Central Intelligence Agency (CIA)

Chief Executive Officer (CEO)

Corporate Social Responsibility (CSR)

Chinese National Petroleum Corporation (CNPC)

Energy Return On Investment (EROI)

Exclusive Economic Zone (EEZ)

Global Business Network (GBN)

Gross Domestic Product (GDP)

Health Safety and Environment (HSE)

International Energy Association (IEA)

International Maritime Organization (IMO)

International Oil Corporation (IOC)

Joint Venture (JV)

Liquid Natural Gas (LNG)

National Oil Corporation (NOC)

Natural Gas (NG)

Northern Sea Route (NSR)

Non-Government Organization (NGO)

Oil and Gas Industry (O&G)

Organization of Petroleum Producing Countries (OPEC)

Production Sharing Agreement (PSA)

Search And Rescue (SAR)

United Nations Convention on the Law Of the Sea (UNCLOS)

United States Coast Guard (USCG)

Yamel-Nanets Autonomous Region / District (YANAO)

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Chapter 1 Introduction

1.0 Current context of hydrocarbon development in the Kara Sea

In the fall of 2014, Arctic offshore drilling in the University-1 prospect in Russia's Kara Sea penetrated into the hydrocarbon zone and indicated an economically viable crude oil field (Sputnik News 2014). This Arctic offshore exploratory drilling "success" of the Rosneft-ExxonMobil Joint Venture (JV) stands in contrast to Statoil's efforts to the immediate west in the Barents Sea (United Press International 2014) and Shell's announced economically unviable results in the Chukchi Sea off Alaska (Dlouhy 2015). Also in 2014, the Norwegian owned West Alpha rig conducting the Kara Sea drilling, was directly impacted by foreign policy imperatives; it was halted by punitive Western sanctions on the Russian hydrocarbon industry. These sanctions were imposed on frontier hydrocarbon high technologies, supporting banking, specific individuals (such as Rosneft's Chief Executive Officer (CEO) Igor Sechin) and new projects in response to Russian policy actions in Crimea and the Ukraine (Henderson and Loe 2014). ExxonMobil's own CEO Rex Tillerson, Rosneft's partner in the JV, personally engaged with the US Treasury Department for a two-week extension to the sanction deadline to allow for the safe curtailment of drilling (ExxonMobil 2014).

The strategic context of these events was both a push for new hydrocarbon reserves by the largest International Oil Corporations (IOCs) and the geopolitical priorities of the Russian Federation. In comparative numbers, the Arctic has 13% of the world's remaining undiscovered reserves of oil and 30% of the Natural Gas (NG) (Gautier 2009). It is estimated that of this total, 75% of the circumpolar Arctic hydrocarbons lies offshore, the remaining 25% onshore (National Petroleum Council 2015). The greatest proportion of these undiscovered Arctic hydrocarbon resources are within Russia's Exclusive Economic Zone (EEZ) on its continental shelf and the Kara Sea is considered to have the richest hydrocarbon reserves of all (Piskarev and Shkatov 2012). Thus, both in terms of recent exploratory success, as well as by virtue of the magnitude of predicted recoverable undiscovered reserves, Russia's Kara Sea can be seen as the most significant undeveloped region in the Arctic Ocean for hydrocarbons and shares with Alaskan waters the best potential for traditional crude oil (National Petroleum Council 2015).

1.1 Significance of the study

The Kara Sea is both in the forefront of global energy strategies *and* a foreign policy concern of high order, but it also lends itself to study for unique and cross-disciplinary values that predate and supersede the topical issues of Western sanctions and Arctic energy ventures. In Russia, for over a century the strategic commercial objectives of the international Oil and Gas (O&G) industry have had a unique, generally obscure, but highly significant relationship with Russian strategic priorities. For the current regime, hydrocarbon exports have been a central element in re-establishing geopolitical relevance. In a governmental policy lens, the Kara Sea is a frontier region critical to the Russian Federation's strategy of expansion of energy production in the Arctic (Strategic 2013). Hydrocarbon exploration and the necessary infrastructure development for extraction is likely to continue to drive central government priorities for the management and regulation of the Northern Sea Route (NSR) and continued hegemony of its littoral Arctic regions. What does and does not develop in terms of hydrocarbon extraction in the Kara Sea will likely be a strong trend indicator for Russia's development success on its geographic and technological frontiers; and characterize its relative capacity as a state actor to mid-century.

1.2 Statement of the problem and purpose

It is proposed that a detailed, comprehensive interdisciplinary assessment of the hydrocarbon extraction enterprise in the Kara Sea can provide insight into the nature of a future Russia's relative strategic stability and capacity to make future foreign policy choices. Russian development of its Arctic natural resources, particularly hydrocarbons, is central to its overall geopolitical strategy and is candidly declared so in its strategic policy. The need to expand and to maintain its hydrocarbon production level is a strategic Russian imperative. Failure to do so in the 1980s, it has been convincingly argued, was a causal factor in the Soviet Union's collapse (Reynolds and Kolodziej 2008). An identified declared risk and threat to Russia's Arctic strategy is a: "…lack of modern technical means and technologies for exploration and development of offshore hydrocarbon fields in the Arctic (Strategic 2013, 2)."

The sheer size of the hydrocarbon reserves in the Kara Sea, particularly of oil, may be great enough to impact the long-term progression or regression of the Russian economy, and

thereby influence future policy decisions and interactions with the global community in the broadest sense. Rosneft has released estimates of a potential reserves of 87 Billion Barrels of Oil Equivalent (BBOE) (gas and oil) in the three Kara Sea lease areas alone (Rosneft 2014). This equates to close to twice the size of the estimates for offshore Alaska (50.3 BBOE), though the US Alaskan littoral is predicted to have a greater proportion of oil vs gas (National Petroleum Council 2015). In short, the Kara Sea reserves are of a globally significant magnitude and the largest unexploited hydrocarbon potential remaining in the Russian Federation (Piskarev and Shkatov 2012).

But Russian policy *intent*, and multi-billion-dollar investment, whether with revamped or returning Western commercial partners in a post-Western sanction regime, or with emerging new partners, does not ensure success. There were pre-existing strong undercurrents of skepticism that the Russians might not achieve offshore hydrocarbon production at the pace and or the scale they envision *before* sanctions and the dramatic slide in the price of oil in 2014 (Gustafson 2012). Though the direct economic contributions to the *global* economy of exploitation of Kara Sea hydrocarbons is likely not a game changer --- the *technological sophistication* it will require and the *level of cooperation, management techniques* and *integration* needed between with the most advanced IOCs and Russian partners --- could well be for Russian central state stability. And that required cooperation would have to be sustained and survive not only current geopolitical reverberations, but those to come well into mid-century. Additionally, the potential negative environmental impacts of hydrocarbon exploitation in the Kara Sea could have *global* policy ramifications independent, to a degree, of actual quantifiable environmental degradation, e.g. a massive oil spill. Failure by the industry's best practices and the Russian state to mitigate damage to what is a fragile and critical habitat would likely render hydrocarbon extraction in other Arctic regions even more politically and diplomatically difficult, or unlikely.

1.3 Research questions

This investigation's objective was to first identify the key drivers impacting hydrocarbon extraction in the Kara Sea. Some of these drivers were policy driven, e.g. Russian strategic goals; some climatic; and others market based, such as the fluctuating demand and price of oil. These drivers were then analyzed to assess the most critical and uncertain for future development

of the Arctic offshore in general, and when possible, the Kara Sea specifically. The last step was to game or experiment with how these *drivers*, or variables, might interact within a complex system by the creation of plausible future scenarios.

1.4 Tools, methods and research structure

In preparatory research, tools were used from international relations and energy economics. Also incorporated were historical, environmental science, geographic area studies, and technical reports from the O&G industry. Primary research incorporated three qualitative methods; a survey of experts (Chapter 5), and a scenario development process assisted by a workshop (Chapters 6 and 7). The intent was to identify and differentiate between key drivers that could influence future change from the predetermined elements (those that might have causal impact but could be assumed to hold relatively constant in scenario construction) (van der Heijden 2005). The goal was to unmask critical uncertainties as a means of hypothesis development and to frame plausible future scenarios for Kara Sea hydrocarbon development. These scenarios were designed to reveal how differing drivers might interact in structured, complex, but plausible futures.

This process of scenario construction relied heavily on Peter Schwartz's methods developed while at Royal Dutch Shell and Global Business Network (GBN) (Shwartz 1991). Fundamental to this approach is that there is no effort to predict the probability of future events. Rather, the objective is to identify the variables, usually termed drivers, and assess how they might interact within a complex system to produce plausible outcomes or narratives. Scenario futures are not attempts to forecast or predict linear projections into the future. Rather they are used to best prepare decision makers for the uncertainties. Kees van der Heijden, who has often partnered with Schwartz, further characterizes this process: "A scenarios focus on developing and differentiating drivers and how they are interconnected in a complex system, will produce structurally different futures …conceived through a process of causal rather than probabilistic thinking (van der Heijden 2005, 27)."

1.5 Limitations, delimitations, assumptions and worldview

The focus on the Kara Sea region reflects its unique characteristics: the magnitude of hydrocarbon potential; its centrality to the strategic stability the Russian Federation; the global geopolitical significance of foreign policy choices made by that sovereign state; and the proportionally large impact of Kara Sea hydrocarbon development for the circumpolar Arctic offshore. No one discipline could sufficiently address the complexity of the drivers (or variables) and their interactions. Though Arctic *focused,* the study was not Arctic *limited*; key drivers ranged across political and geological borders and a judgment was made that they could not be isolated arbitrarily. Another early judgment was that there was a level of relevant detail specific to O &G operations in the Arctic littoral, especially so in the Russian offshore and Kara Sea, that was not readily transparent or examined holistically in more theoretical academic works or engineering studies. Therefore, I collected that detail, then framed and explored the dynamics within plausible future scenarios. Lastly, in my *pragmatic* worldview, or bias (Creswell 2014), an already complex analysis would have become impenetrable by the addition of philosophical, normative or ideological policy questions; the most potent and unanswerable being is a strong Russia good, or bad?

Chapter 2 General context

2.0 Overview

A focus on the Kara Sea region of the Russian Arctic was chosen to allow a deep look at the hydrocarbon development potential on the geographical and technological frontier, in what is estimated to be one of the most globally significant technically recoverable / undiscovered hydrocarbon reserves, of critical strategic significance to what remains one of the world's traditionally "great power" states. Russia's capacity to retain that status will likely continue to depend on its ability to gain massive capital investment, the most advanced technologies existing, and ability to maintain collaboration with foreign industry to extract offshore Arctic hydrocarbons. There are few similar interdisciplinary studies specific to the Kara Sea with a desired balance of geopolitics, economics and input from the O&G industry, but nonetheless, the literature from the social sciences on the Russian Arctic hydrocarbon policy, strategy and international influences is extensive; and there is highly applicable work bearing on the research questions from energy economics. Due to this interdisciplinary breadth, relevant literature is addressed throughout the background and contextual discussion (Chapters 2 and 3) and embedded in the methods and research design (Chapter 4).

2.1 Centrality of hydrocarbons to Russian strategic stability

Regulation and control of the hydrocarbon industry has been an exceptionally hands-on central government concern in Russia. Following initial relative indifference and incoherence under President Yeltsin, the Russian state under President Putin methodically and systematically emphasized establishing re-control of Russian oil resources (gas always remained primarily under Russian Federation ownership) as the critical step necessary for Russia's resurgence as a major power, and continues to dominate all aspects of its domestic and international policy (Gustafson 2012). The survival of the current political regime, with all its domestic and international policies in the balance, as with its predecessors, can be seen as directly dependent on oil and gas expansion. Russia's inability to continue to grow its economy through lack of success in the expansion of its undeveloped hydrocarbon reserves would be devastating and would threaten the Kremlin's ability to maintain the loyalty of its political power base (Aron 2013). As production output from the traditional *onshore* areas in West Siberia and European

Russia plateau, Russia looks to the Arctic offshore areas as critical to even maintain the daily 2015 production level above 10.5 million barrels of oil. For comparison, this was slightly higher than daily US production which peaked at over 9.5 million barrels in 2015 (US Energy 2016). But while revenue from oil alone accounts for 40% of the Kremlin's total revenue (Tully 2016a) it is a much smaller part of the US overall economy. Estimates of the amount of investment necessary for Russia to maintain that level of oil production, as well as gas, for the next 20 years, are as high as $900 billion (Laruelle 2014a).

2.1.1 Russian dependency on extractive export earnings

The strategic criticality of the hydrocarbon sector to modern Russia can reasonably be characterized as a lineal descendant of the Soviet Union (Reynolds and Kolodziej 2008). A Russian failure to expand its undeveloped hydrocarbon reserves and thereby continue to grow its economy, would be devastating to its ability to maintain the loyalty of its political power base. A constant in the Soviet period that continues in modern Russia, was a need to build hard currency cash reserves. Hydrocarbons, as well as some of the other extraction industries, were critical to obtaining the necessary sums of hard currency not otherwise obtainable in their closed economy. Pointedly: "No other part of the Soviet economy [was] so closely linked with the outside world as the energy sector (Gustafson 1989, 20)." Soviet policy also did not shy from using energy exports as a political weapon. They used cheap fixed price oil exports to its strategic and ideological Cold War allies, such as Cuba and the Warsaw Pact countries. Nevertheless, hard currency derived from hydrocarbon exports (oil, gas and gas liquids) on the global market was critical to export policy and therefore was prioritized, as can be seen by the Soviets refusal to support the Organization of the Petroleum Exporting Countries' (OPECs') 1973 oil embargo, despite the fact that in the Yom Kippur War they were the primary arms supplier and political ally of the Arab states (Reynolds 2011). This reliance on hydrocarbon for export earnings remains for the current central leadership and cannot be overestimated. Russia has not been successful in making structural reforms that would help the economy to diversify away from its reliance on hydrocarbons for export. As a result, economic stability still depends primarily on the oil and gas sector (Morozova 2013).

This sustained dependence on resource extraction, and especially hydrocarbons, which provided *over half of Russia's federal revenue in 2015* (Trading Economics 2016), can partly be understood by what economists term "Dutch Disease." This economic condition is characterized by the predominance of a single commodity, especially true for high hydrocarbon revenues, on a nation's overall economy. In the archetype case study of the Netherlands in the 1960s and 1970s, newly introduced natural gas wealth raised the value of the Guilder, and thereby significantly suppressed investment and export of other Dutch industry (Rudd 1996; Karl 1997). This economic model is often used to explain similar, often more stark economic and institutional conditions, in the less developed world where a very high percentage of the economy is based on rents from extractive industries, and the proportion of central government engagement in the major drivers of the economy is disproportionately large as well as non-transparent (Ross 2012). Relevant also to consider are stagnant ongoing macro-economic conditions in Russia, though Russia's scientific base and historic relative world power mitigate extending the economic model too far.

2.1.2 Russia's Arctic strategy and energy production

Russia's geopolitical ambitions are correlated to success in its hydrocarbon energy sector, much as were its Czarist and Soviet predecessors (Goldman 2010). Before Vladimir Putin's rapid ascendance to president, he wrote his doctoral thesis outlining a more powerful Russian state that could only be financed through the extractive industries, particularly gas and oil. He identified, as did others, the necessity of a reliance on these industries, to rebuild the lost power of the humiliated central government and its bureaucracies, such as the KGB from which he himself came (Dawisha 2014). Expansion of energy production fundamentally underlies the main drivers that shape Russia's Arctic policy: new reserves to maintain energy superpower status; the capacity to reassert Kremlin domestic control; industrial revival; and hope for recognition by the world community as a great power (Laruelle 2014b).

In Russia's 2013 Arctic Strategy, development of its Arctic offshore oil reserves is clearly more than an important policy goal for the Russian Federation; it is *the* strategic priority and influences discussion of other priorities, such as endemic economic hardship. The freefall collapse of the Soviet Union impacted the Northern Regions with particular harshness

accelerating demographic decline and unsustainability in many centrally planned industrial settlements supporting the military-industrial complex (Blinnikov 2011). Even NSR infrastructure development and the need to rebuild its icebreaker fleet, though prominent, is arguably only a supporting strategic endeavor enabling hydrocarbon extraction: "…in order to diversify the main supply routes for Russian hydrocarbon to world markets (Strategic 2013, 11)." An explicitly identified risk and threat to its Arctic goals are a lack of modern technologies for exploration and development of offshore hydrocarbon fields necessary to maintain and expand production. Russia's hydrocarbon extraction objectives are dependent on foreign willingness to provide the necessary investment capital and technology, which is acknowledged candidly in its 2013 Arctic Strategy (released prior to the dramatic negative shift in relations with the West and the sanction regime).

2.1.3 The Kara Sea: strategic maritime region for the Russian Federation

Success in development of Russia's offshore hydrocarbon reserves, especially oil, will allow for the stabilization of Russia's future economy and overcome the depletion of its existing reliance on aging fields in Western Siberia:

> Development of hydrocarbon potential of the continental shelf of the Arctic Seas and northern territories of Russia is intended to play the stabilizing role in oil and gas production dynamics, compensating possible decrease in production level in traditional oil and gas producing regions of the Western Siberia for the period 2015-2030 (Energy 2010, 60).

The South Kara Sea has the greatest potential of those offshore regions due to magnitude of the scale of the reserves (still unproven) *and as a threshold, or bridge*, to the even more challenging North Kara and Laptev Seas. If the technological and operational complexities of extraction in the South Kara Sea can be surmounted, as intended by the Russian Federation and the O&G industry, it could prove a strategic step to advance hydrocarbon extraction for the rest of the frontier Arctic shelf (Piskarev and Shkatov, 2012).

2.2 Context of Kara Sea hydrocarbons

Geographically, Russia controls roughly half of the circumpolar coastline and proportionate EEZ and is generally seen as controlling the most significant hydrocarbon reserves in the Arctic Ocean (Gautier 2009) (Note: for crude oil, Alaska's offshore reserves are also comparatively significant). "Russia is estimated to have by far the largest Arctic resource potential…and will continue to be a dominant player in Arctic oil and gas development (National Petroleum Council 2015, E11)." As outlined by Piskarev and Shkatov, globally, in the last 20 years:

> …the resource base of the main hydrocarbon…supplier countries has been increasing, chiefly due to offshore fields…exploration geologists all over the world are increasingly convinced that a major share of the so far undiscovered large fields is confined to the subsurface of the Arctic Seas of Russia (Piskarev and Shkatov, 2012, vii).

Russia's offshore Arctic shelf potential of large reserve fields is assessed between 300 to 600 billion barrels of oil equivalent (Russian estimates tend to be in the higher range). Of those offshore areas, the Kara and the Laptev Seas indicate the greatest potential, the Barents Sea less so (Piskarev and Shkatov, 2012). Assessment of reserves in undiscovered hydrocarbon basins are based on theoretical analysis and modeling of geological formations, and generally, preliminary seismic data. There remain many unknowns before actual exploratory drilling, such as the difficult to ascertain ratio of the more valuable oil to gas. Also critical unknowable in detail, are the future market dynamics that will determine the viability, and thus the timing of exploiting "technically recoverable" reserves. Vagit Alekperov, current CEO of LUKoil, characterizes the offshore potential, "…production of crude hydrocarbons produced on the continental shelf could reach 20% of total crude hydrocarbons produced in the Russian Federation…The bulk of the resources (about 66.5%) lie under Arctic shelves (in the Barents and Kara Sea) (Alekperov 2011, 333)." Figure 2.1 illustrates by country the "estimated" relative proportion of "Arctic" conventional reserves of both oil and gas. Figure 2.2 illustrates the proportion "offshore" to onshore (roughly 3 to 1). Note: estimate totals differ significantly in total magnitudes among various national assessments and proprietary corporate studies, but nonetheless remain relatively "proportionally" consistent on an Arctic wide scale (defined by the "Arctic Circle" for Figures 2.1 and 2.2).

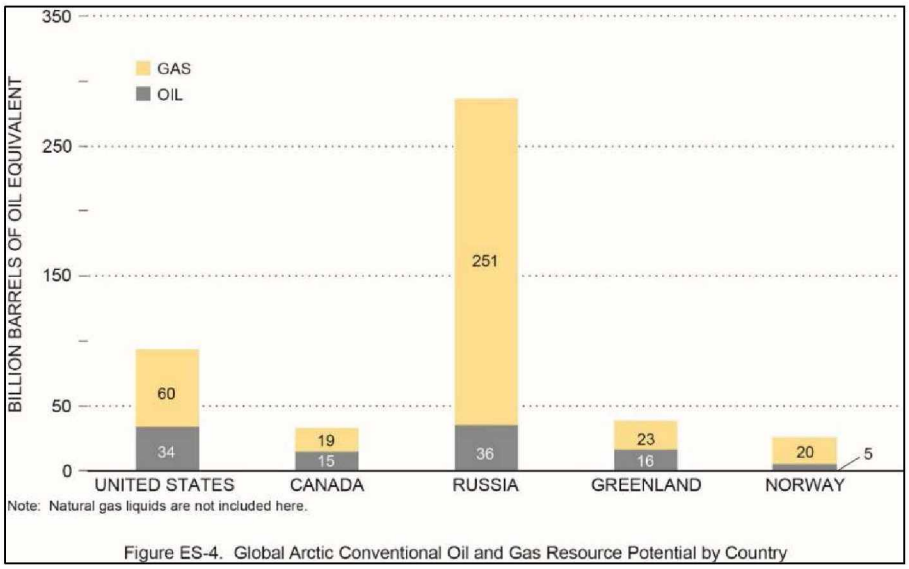


Figure 2.1 Global Arctic oil and gas by country

Source: National Petroleum Council, *Arctic Potential: Realizing the Promise of U.S. Arctic Oil and Gas Resources,* 2015, page (E-12). Copyright permission granted (Appendix C)

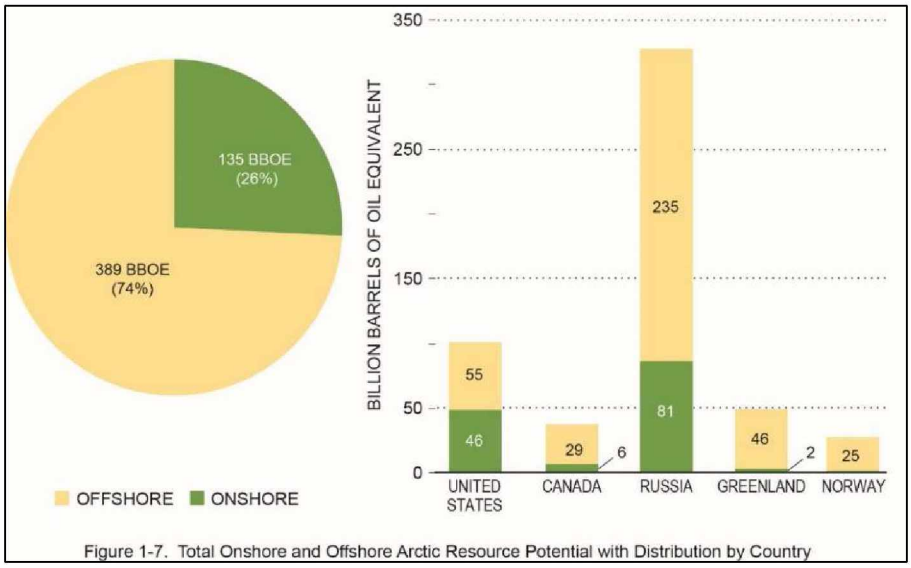


Figure 2.2 Onshore vs offshore potential by country

Source: National Petroleum Council, *Arctic Potential: Realizing the Promise of U.S. Arctic Oil and Gas Resources,* 2015, page (1-8). Copyright permission granted (Appendix C)

Figures 2.1 and 2.2 above clearly indicate that Russia's hydrocarbon potential is the greatest by far among circumpolar nations, and is predominantly offshore and gas. Figure 2.3 below depicts the Kara Sea 2014 drilling by the Rosneft and ExxonMobil JV in their University-1 prospect in a circumpolar perspective.

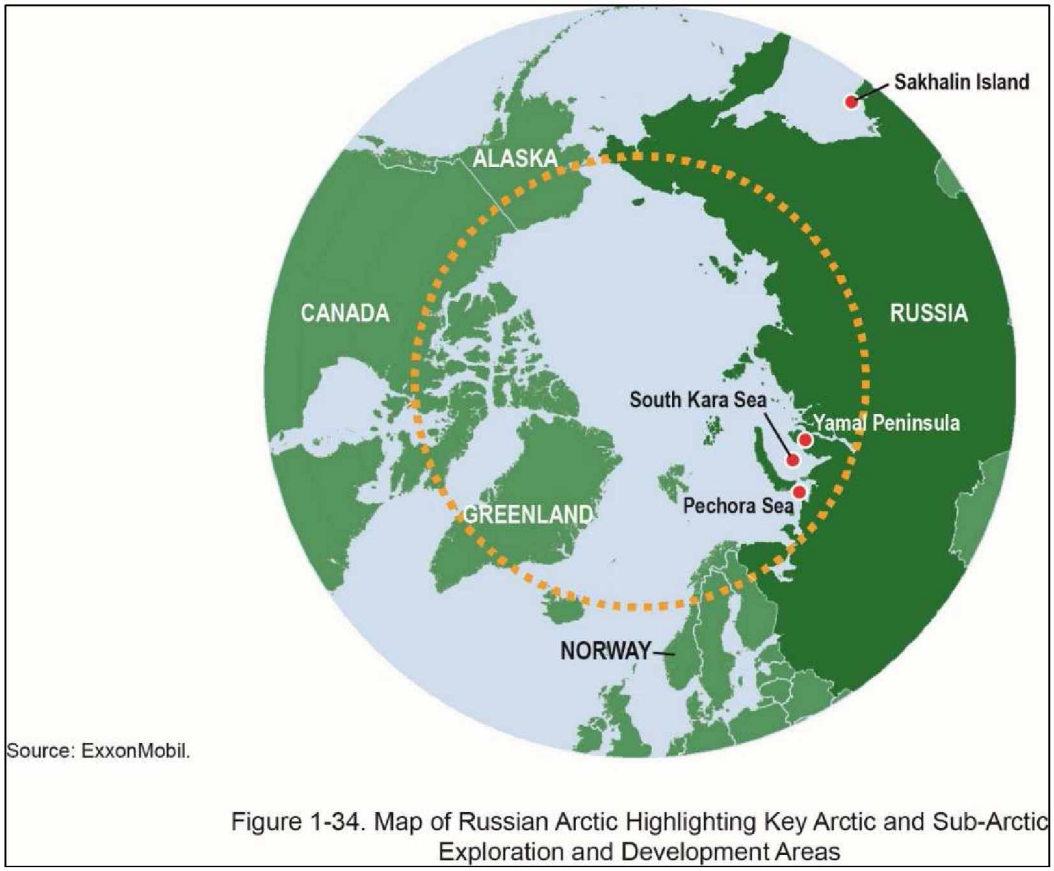
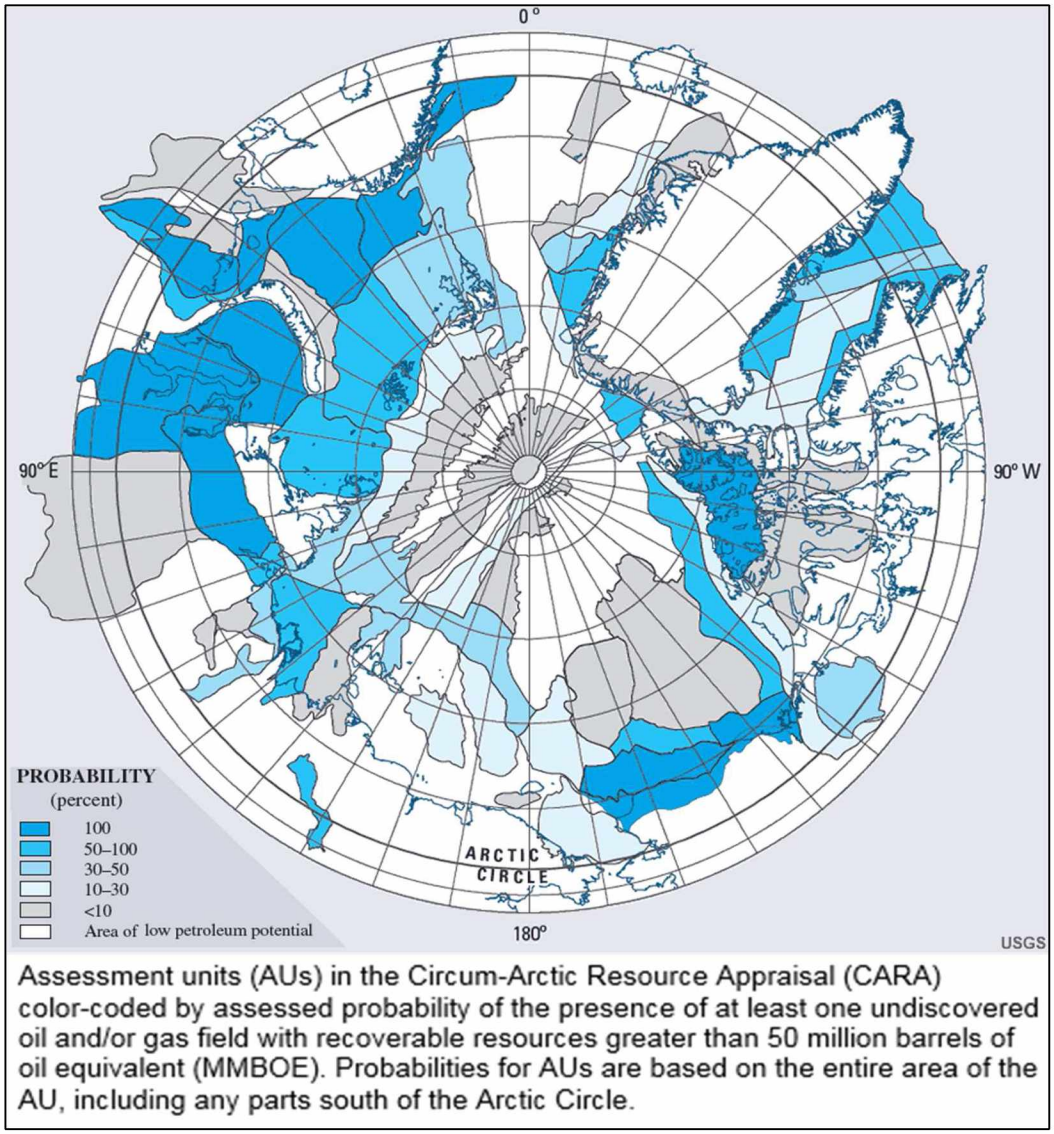


Figure 2.3 Site of South Kara Sea drilling 2014

Source: National Petroleum Council, *Arctic Potential: Realizing the Promise of U.S. Arctic Oil and Gas Resources,* 2015, page (1-34). Copyright permission granted (Appendix C)

Figure 2.4 below depicts an estimate, widely used, published by the US Geological Survey of the Arctic's relative resource hydrocarbon density distribution. The Kara Sea clearly stands out in the center-left below. This depiction does not assess the economic viability of extraction.



Assessment units (AUs) in the Circum-Arctic Resource Appraisal (CARA) color-coded by assessed probability of the presence of at least one undiscovered oil and/or gas field with recoverable resources greater than 50 million barrels of oil equivalent (MMBOE). Probabilities for AUs are based on the entire area of the AU, including any parts south of the Arctic Circle.

Figure 2.4 Estimates of undiscovered oil and gas north of the Arctic Circle

Source: US Geological Survey, "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle," July 2008. Public Domain confirmed (Appendix C).

If it is assumed that the oil reserves in the offshore Russian Arctic are within the general assessed magnitude (30-40 billion barrels for the Kara Sea) (Piskarev and Shkatov, 2012), the most challenging unknown is the *timing of the economic and logistical feasibility* of exploiting

the very different, specific offshore regions, requiring in some cases, currently undeveloped technologies (the Barents is less ice challenging than the Kara Sea, for example).

2.2.1 Specifics of Kara Sea Rosneft-ExxonMobil JV

October 2014 saw the seasonally pre-mature shutdown of exploratory drilling in the Kara Sea as a result of compulsory punitive sanctions prohibiting ExxonMobil's continued collaboration with its JV partner. At the University-1 site, drilling occurred in the open water August-October on the continental shelf. It was a conventional well in approximately 80 meters of water, drilled about 2,300 meters deep. The Norwegian owned West Alpha rig was semi-submersible and designed for the harsh operating environment (ExxonMobil 2014). The project is now on hold as a result of both specific foreign policy objectives of the world's major powers (China excluded) and a significant shift in market conditions (continued drop in oil demand vs supply) (Kennedy 2015). It is unclear if the Rosneft-ExxonMobil JV relationship will continue or resume as structured if and when legal restrictions are removed. In this context, it is relevant to consider that Rosneft's original strategic partnership, negotiated for over a decade, was with British Petroleum (BP) not ExxonMobil. However, litigation in 2011 resulted in a decision by the Court of International Arbitration in Stockholm that would have awarded the partnership to a firm that lacked the finance and technology an IOC could bring to the JV. "As a result, at the end of August 2011 Rosneft reached a very similar deal [to what had been negotiated with BP] with ExxonMobil to develop the Kara Sea (Bradshaw 2012, 219)." It is a Russian strategic objective to develop the Kara Sea, perhaps even if only marginally economically viable; and for the most capable of the IOCs, the magnitude of its geological potential has been worth the complex risk and massive necessary investment. These drivers will likely remain for the foreseeable future, though the specifics of the business relationships, and the ownership of the corporations involved, may change or evolve. This also holds true for the mandated foreign vs Russian owned proportion, or the public-private ratio for Russian projects. To meet its need for funds in the current austere economic and fiscal environment, the Russian central government announced approval for the privatization of 19.5% of Rosneft and 50% of Bashneft (Russia's 6th largest oil firm).

Nonetheless, for this study's multi-decade, strategic focus, the Rosneft-ExxonMobil JV holds relevancy, though suspended. It is descriptive, both in manner and form, of how the Russian Federation implements its Arctic policy objectives. The scale and vision of the Kara Sea project is truly huge, announced to be on the order of $400 billion by Rosneft's CEO (Kennedy 2015). The collaboration is structured so that ExxonMobil owns only a third of the JV with Rosneft (which includes the Kara Sea leases). This allows ExxonMobil enough control to book reserves on its balance sheet and also includes a key incentive; a purposely designed favorable tax structure for IOCs investing in Arctic offshore regions. ExxonMobil and Rosneft both requested such a tax change as a prerequisite for the agreement. The license was exclusively granted to Rosneft, but operated by a Karmorneftegaz JV, a company jointly owned by Rosneft (66.7%) and ExxonMobil (33.3%): "That company will fund all expenditures and receive cash flows, which will then be shared between the partners in accordance with their equity interest (Henderson and Loe 2014, 30)." Russia's leasing concession process, much like Norway's and the UK's, allows foreign concessions to be excluded, unlike the wide open bidding in the US offshore regions (Parra 2013).

During the exploration phase ExxonMobil is to fund the entire cost of the first six wells estimated at $3 billion. As the project moves into production, costs are to be shared on a pro rata basis. Significantly, ExxonMobil covers all exploration costs until oil is discovered. The pre-agreement Russian tax model did not take into account or allow for deductions for expenditures, nor take into account profitability, and had an overall tax rate of about 70%. There is, "no allowance for accelerated cost recovery in the early years of production (Henderson and Loe, 2014, 30)." The new tax structure, approved by the central government, is a system based on "profit" and takes into account the varied difficulties of development in different offshore regions. The South Kara Sea is grouped in the fourth tier, which has the lowest tax rate; no mineral extraction tax, and a profit tax of 20% only after costs are accounted for. Also included in this grouping are the other regions given the most incentive, including the northern Barents Sea and eastern Arctic. By comparison, in descending order of incentive, the southern Barents Sea is in the third, offshore Sakhalin the second and the Black Sea in the first (Henderson and Loe 2014). The following Figure 2.5 displays the lease areas for that 2014 exploratory drilling.

To help visualize the size of the hydrocarbon region, superimposed with a dotted line is the United Kingdom North Sea area (Central and Northern).

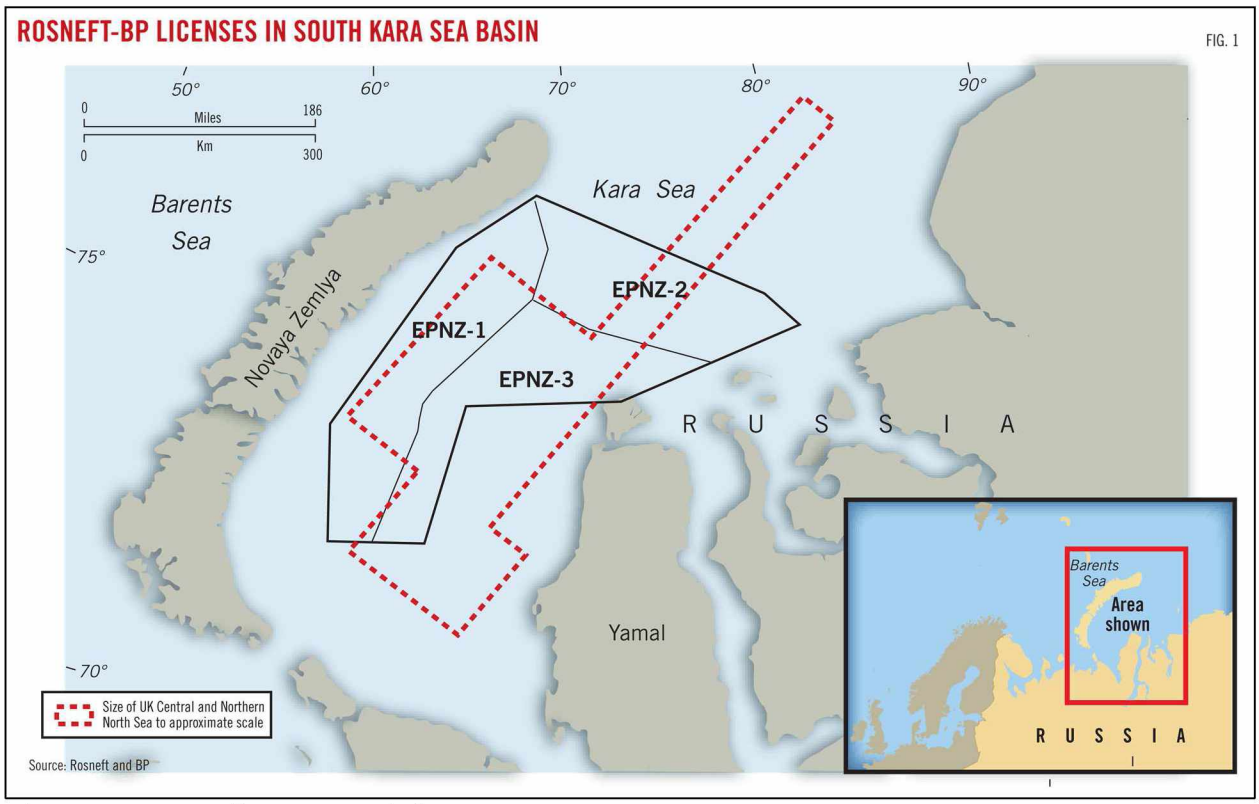


Figure 2.5 Kara Sea 2014 drilling

Source: Oil and Gas Journal. Copyright permission granted (Appendix C)

2.2.2 Major projects in the Kara Sea region and their inter-relationship

To the southwest of Novaya Zemlya, in the Pechora Sea (southern edge of the Barents Sea), Gazprom Neft, a subsidiary of Gazprom, has begun oil production from a floating drill site 60 kilometers from shore. The Prirazlomnoye oil field is assessed at approximately .5 billion barrels of oil, which is significant, but about half of Rosneft's announced exploratory results at the University-1 drill site (Gazprom 2016). It is also at a less challenging 20-meter depth (the 2014 Kara Sea University-1 drilling was in 80 meters of water, 100 kilometers from shore, in harsher ice conditions). But if its annual production level reaches close to the projected 50 million barrels, it could impact the economic feasibility of Gazprom's rival Rosneft to the west in the Kara Sea. The market viability in a general sense to all hydrocarbon projects, but especially the largest in most difficult frontier regions, such as in the Arctic offshore, is the

proximity of infrastructure to transport production to the customer. Other projects, even from industry rivals, spread development of infrastructure costs to a wider base and allow for a synergy of effort. Potentially an innovative, clustered pipeline infrastructure could be shared regionally for projects in both the Barents and Kara Sea. Anchor fields, and a number of satellite fields, on both sides of Novaya Zemlya would share the same pipeline to shore, or to ship, infrastructure (Efimov, Zolotukhin, and Kornishin 2014). Such a concept would allow transit to European markets from terminals in the Barents Sea which would have significantly less harsh ice conditions.

Rosneft's major Russian O&G rival, Gazprom and its Western JV IOC partners, have suspended the Schtokman project, though it remains one of the most significant gas discoveries ever made. Its remote location in the Barents Sea, 550 kilometers from the Kola Peninsula, has proven unmarketable to currently develop (National Petroleum Council 2015). Norwegian oil production (all Norwegian production is offshore) dropped significantly in 2013, impacted by increased taxes and the doubling of costs between 2005-2013 (Strategic Assessment 2014). Declining market conditions also have contributed to delays in Norwegian lease areas, but production began in 2016 in Eni and Statoil's Goliat oil field, 85 kilometers northwest of Hammerfest, and is the furthest north Arctic oil production (Eni 2016). Statoil's Johan Castberg oil field, even further northwest of Norway, has seen reduced but continued investment. The break-even profitability of production vs cost associated with the project have not been released, but in general terms, statements from Statoil imply a $50 to $60 per barrel price is needed (Holter 2016). Both these projects and associated fields are estimated to be significantly smaller than the University-1 site in the South Kara Sea, but are also closer to European markets and without the much restricting seasonal ice conditions.

2.2.3 Timelines and their impact: exploration to production

Success for hydrocarbon resources in the frontier Arctic offshore will require massive investment and projects of great enough scale to be marketable. Though there are differences, a timeline analysis by the US Bureau of Offshore Energy Management (BOEM) for the offshore lease areas off the Alaskan coast in the Chukchi Sea has comparative value. In their analysis the timeline from exploration to final production is estimated to be about 75 years. The concept

modeled by BOEM in October 2014 to estimate long-term production impacts assumed a profitable "anchor" discovery would have a multiplier effect as it would allow for production in less profitable "satellite" discoveries that could be connected by undersea pipelines to the anchor platforms. Of special significant for the Kara Sea, which is estimated to have even greater potential for gas, NG production modeling indicated that after year 31, or about 20 years after crude oil begins production, NG could be economically recovered as well with much of the same core infrastructure created for the more profitable crude oil (Bureau of Ocean Management 2014).

2.2.4 The Northern Sea Route

Of critical importance to any hydrocarbon project in the Russian maritime Arctic is the revival of the robustness of the infrastructure of the NSR. The overall extractive transport concept for crude oil would be to utilize the NSR for tanker transit to the global market. For gas likewise, the NSR allows Liquid Natural Gas (LNG) transit to global gas markets not bound by the Eurasian pipeline infrastructure (STRATFOR 2013). Currently the NSR can be characterized as an improving route for destination shipping, mostly port to port within the NSR, with an increasing but still small comparative volume of seasonal through global shipping primarily in support of Arctic extractive industries. The number of such voyages remain small and they are perhaps best characterized as experimental or demonstrations (World Economic Forum 2014a). Revitalizing the NSR infrastructure into a "global" trade route is recognized in Russia's 2013 Arctic Strategy as a fundamental to the socio-economic development of their Arctic Zone which is now hampered by:

> …depreciation of fixed assets, particularly transport, industrial and energy infrastructure…[and]…underdevelopment of basic transport infrastructure, its marine and continental components, aging icebreaker fleet, lack of small aircraft…. [therefore, it is Russia's intent by 2020 to prioritize]…development of Infrastructure of the Northern Sea Route and the Navy, including icebreakers, for solving the transport of arctic areas, and Eurasian transit (Strategic 2013, 2-3).

The term NSR "revival" is an accurate one, for in the Soviet era, during the more severe climatic ice conditions of the 1950s through the 1980s, with great effort and expense, the NSR

was an effective transit quarter for thousands of ships, though not one designed or capable of competing in global shipping markets (Brigham 1991). But the Cold War NSR was an internal maritime corridor, tightly controlled, developed and maintained for strategic military purposes, integral to Russian Arctic heavy and extractive industries; and one fundamentally to allow the USSR independence from the global vulnerability of Western controlled commodity markets. The newly envisioned NSR of the Russian Federation is in some ways much the opposite of its Soviet predecessor. It is a recognized central piece of a Russian strategy to be successful in offshore hydrocarbon extraction *for profit from the global market*.

2.2.5 Yamal and the Sabetta Port Project

The Kara Sea in addition to its oil riches, is also world class in predicted NG reserves that are a geological extension of the inland West Siberian hydrocarbon fields that have been in production for 50 years (Piskarev and Shkatov 2012). Yamal has been, and is now, the largest producing gas field in the Arctic (on shore), but is also geographically central to the even greater offshore reserves and well placed to be the major industrial hub for offshore hydrocarbon extraction. The Sabetta Port and LNG project currently under construction on the western edge of the South Kara Sea, on the Yamal Peninsula, is poised to be a logistical port for the broadening of hydrocarbon extraction offshore and onshore in the Yamal-Nenets Autonomous Region. The Project is central to Russian energy and geostrategic objectives; both as a new export hub for the developed gas fields ashore and for future extraction on the Arctic shelf. Once completed, the Sabetta LNG port will be the largest LNG shipping facility in the Arctic (Total 2014). If all three trains are completed, output is projected to be 16.5 million tons of LNG per annum. By comparison, Chevron's Gorgon facility in Western Australia, which came on line this year, is similar in scale at 15 million tons per annum, though it is only one of a half dozen such new or planned LNG projects in Australia (Maritime Executive 2016). Note: The term "trains" refers to LNG processing units. A typical large facility would have multiple trains running in parallel.

While NG has long been exploited in the Yamal region, the vision for the Sabetta project is different in both scale and kind. It seeks a market not constrained by overland natural gas pipeline systems, but one that compete across the globe in a growing LNG market by use of

polar class tankers that can transit west along the NSR all year towards Europe, as well as east with dedicated ice breaker support in a potentially extended summer transit season. The major LNG plant near Sabetta will be supplied with gas from fields in the Yamal Peninsula and will be built to handle annually more than 30 million tons of cargo. The project was initially a corporate joint venture of French-owned Total (20%) and Russia's Novatek (80%) (Novatek 2014). However, as the project has had difficulty obtaining investment loans from the EU and US in the current sanctions regime (one of Novatek's major shareholders is on the sanctions list), Chinese firms now have a 29.9% share of the project; Chinese National Petroleum Corporation (CNPC) holds 20% and the Silk Road Fund holds 9.9% (Novatek retains a 50.1% controlling interest and Total remains engaged with 20%). The first phase of the three phase project is expected to be operational in late 2017 and the third by 2021 with Chinese and other Asian consumers the primary initial market. The Russian central government has contributed significant support; all imported equipment has been exempted from taxes and a $2.5 billion loan has been allocated from the National Welfare Fund at a low interest rate (Gerden 2016). The massive project cost (the LNG plant itself was estimated at $27 billion---and is continually rising), also includes a fleet of 16 ice capable tankers and other very large supporting operations (Hydrocarbons Technology 2014).

Sabetta Port and LNG facility will have to compete in a global LNG market. Regionally, the Barents Sea to the west also has impressive hydrocarbon reserves and an operating Norwegian LNG plant. The Barents is also closer to European markets (Ebinger, Banks, and Schackmann 2014). Many of the infrastructure and environmental challenges the Sabetta LNG project will have to overcome have parallels to the offshore Kara Sea region into which the Yamal Peninsula protrudes; both in a geographical and geophysical sense. However, in sparsely developed Arctic regions distances can be deceiving. It is in the range of 500 kilometers by air from the University-1 prospect 2014 drilling site to the Sabetta Port on the Yamal Peninsula. Transit by sea is not direct and significantly longer, for the foreseeable future, with harsh ice conditions most of the year. It is also possible that offshore hydrocarbon production, if it does come to the region, will use alternative means of infrastructure support in concert with Barents Sea production.

2.2.6 Maritime character of the Kara Sea

Offshore drilling conditions in the South Kara Sea, are considered moderate for the Arctic. Operations must contend with comparatively much greater ice extent than the southern Barents Sea, but it is not as harsh an environment as for example, as the North Kara Sea, Laptev Sea to the east, or Northeastern Greenland. The summer drilling open water season varies, but is about two months at the 2014 offshore University-1 drill site. Maximum ice thickness is rated at 2.2 meters with ice loads less than offshore Sakhalin. Minor icebergs along the coast of Novaya Zemlya are much smaller than what is encountered along eastern Canada. A comparative chart of Arctic offshore regions is in Figure 2.6. The South Kara sea drilling region is within current O&G technological capacity, and is viewed as valuable and sequential "step out" onto the Russian shelf for more demanding regions, in terms of ice severity and new technology requirements. The biggest technology gap is economic drilling of wells in water limits beyond the limits of bottom founded structures (generally 100 meters) (Chevron 2012).

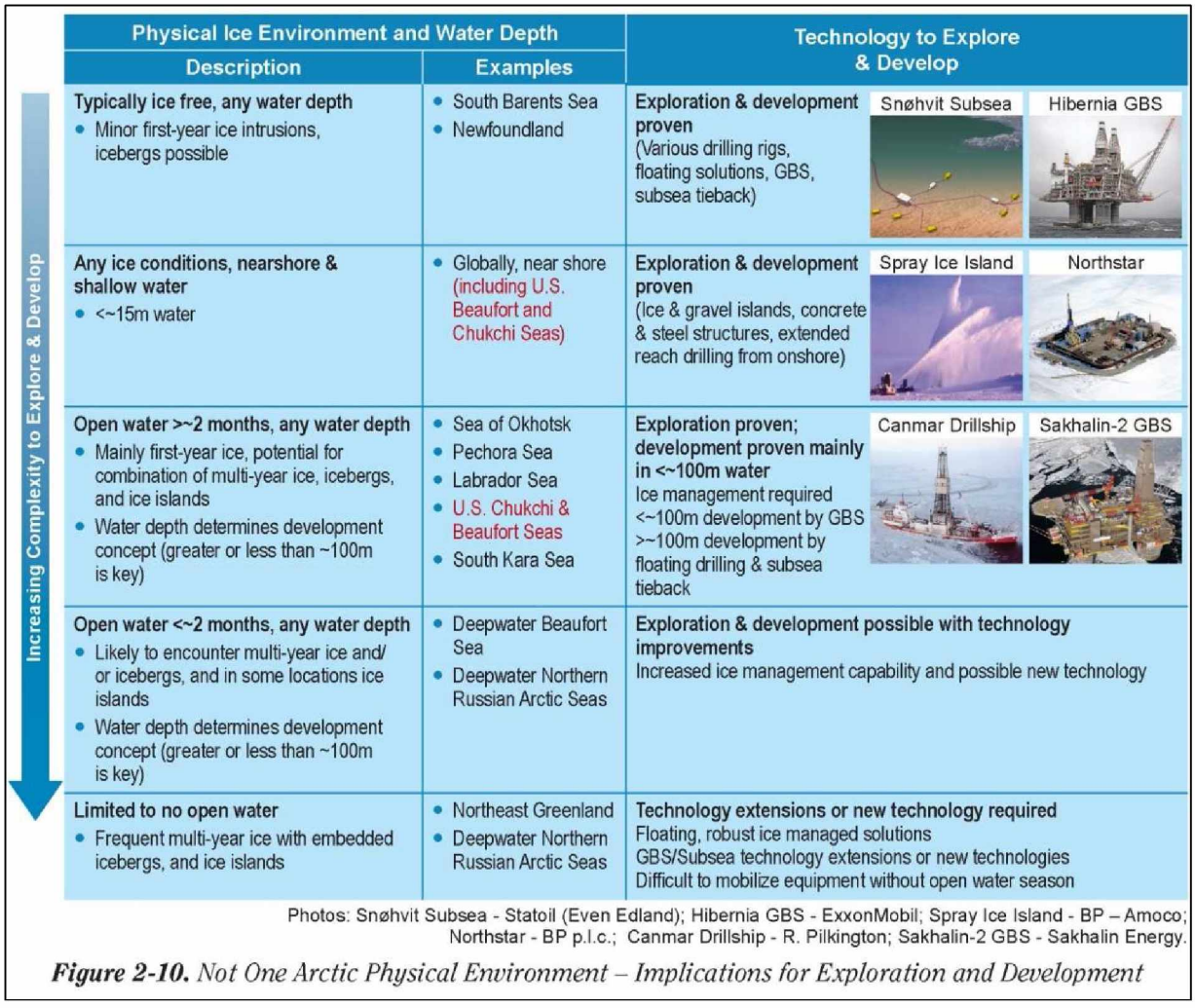


Figure 2-10. *Not One Arctic Physical Environment – Implications for Exploration and Development*

Figure 2.6 Comparative Arctic offshore ice conditions

Source: National Petroleum Council, *Arctic Potential: Realizing the Promise of U.S. Arctic Oil and Gas Resources,* 2015, page (2-16). Copyright permission granted (Appendix C)

2.2.6.1 Impact of climate change

Climate change trends have increased seasonal ice free zones as well as the length of the seasons themselves, especially in Arctic Eurasia, which includes the Kara Sea and Russia's traditional NSR. The speed and specific effects of climate change on the characteristics of the ice pack in the Kara Sea are hard to predict, but there is strong scientific consensus that there will be a continued reduction in the *summer* sea ice extent; an accelerated disappearance of multi-year ice, especially on the Eurasian side of the pole; and the lengthening of the exploration season and navigation service (within the timeframe of currently planned Arctic offshore hydrocarbon projects past mid-century (Arctic Council 2009). Climate change will not create an

ice-free Arctic Ocean year round as sea ice will always re-form during winter and remain partially ice-covered in the spring and autumn. Paradoxically, this can increase risk by greater unpredictability of ice encounters. It is also important to note that ice properties and coverage will vary greatly within the Arctic regions. And sea ice is not the sole obstacle to shipping and maritime structures such as drilling platforms. Other challenges include polar darkness, poor charts, lack of critical infrastructure ashore and navigation control systems, low Search And Rescue (SAR) capability, high insurance / escort costs and other non-climatic factors (World Economic Forum 2014a). Thus, longer sailing and exploration seasons in Arctic waters may be offset by the difficult to quantify changing conditions ashore as well as at sea; which may increase the cost of extraction (Smith 2011). Though climate change impacts are, and are expected to be increasingly significant, global markets remain the biggest driver for offshore hydrocarbon development Arctic wide, and the Kara Sea specifically.

2.2.7 Regional social impacts on hydrocarbon development

Russian Arctic *offshore* oil exploration and production is exclusively a central government policy concern not subject to direct regional government or peoples' capacity to tax, regulate or influence. Inland, it is worth noting that the central government has retained actual ownership of sub-surface hydrocarbons from the days of the czars. The most important two bureaucracies regulating Russia's hydrocarbon industries are the Ministry of Natural Resources and Environment and the Federal Service for Environmental Technology and Nuclear Surveillance Issues. Formal regulations allow extraction and use under multiple arrangements but this "use" can be restricted for national security or natural environmental concerns (Morozova 2013). There is little likelihood that key decision making on hydrocarbon extraction will devolve to administrative institutions, regional government or suffer benign neglect.

The indigenous population ashore in the Yamal region, where most of the infrastructure is planned for NG extraction and the new LNG project, have a history of interaction with the O&G industry that cannot be characterized as entirely positive or negative. From the positive perspective, the regional governing authority, the Yamal-Nanets Autonomous Region / District (YANAO) ranks fourth in Russia for direct foreign investments per capita and second in Russia overall for a sustained 10-year period. This favorable investment and development climate is

directly correlated to oil and gas development. The largest indigenous regional group, the Nanets, number about 40,000 throughout the district. Other significant numbers of indigenous people include the Khants and Selkups (Total 2014). Igor Osipov characterizes the indigenous population of the Yamal-Nanets region:

> Though the Yamal is the most resource-rich region in Russia, where 90% of the natural gas and 15% of the oil in Russia is currently developed and exported…Yamal is [also] home to a variety of local communities and indigenous groups living intact nomadic lifestyles both inland and near the coastline; and Yamal is the base for the largest reindeer herd in Eurasia, numbering between six to seven thousand (Osipov 2012, 15).

Inclusive *social license* to operate concepts for the O&G industry in Russia are complex and civil society is generally seen as weak, with little institutional engagement for stakeholder's interests. However, as shown in a case study from the Komi Republic, there may be other factors influencing regional support, where, "…decisions are made in the oil capital of the region…where the population has a high proportion of incomers, and has experienced many benefits from the industry (Wilson and Stammler 2016, 6)." There is a pattern of extractive industries in Russia, and a great many other places in the world, to rely on transitory workers from distant urban areas outside the region, who operate in closed enclaves. A maritime extraction method, via oil or LNG tankers, may prove to have little direct interaction with inland societies.

2.2.8 Character of governance

Russia controls the preponderance of hydrocarbon resources in the Arctic. Faced with these dynamics, the most significant portion of Arctic hydrocarbon development will be under, and deeply characterized by, Russian governance. This holds especially true for the Kara Sea, which unlike the Barents Sea to its west, shares no international borders. That governance will likely continue to prioritize hydrocarbon extraction commensurate with the strategic level priority of the political leadership, on par or superior to any other. In Russia, especially in the Arctic regions, *governance* in a holistic sense is generally considered among political scientists to be immature and underdeveloped in comparison to the other eight members of the Arctic Council (AC) (McBeath 2010). Rights and legal protection for individuals and groups are weak.

Regional elections for governors were abolished in 2004, after which governors became residential appointees. There is a: "dysfunctional and hyper-centralized relationship between the capital and the 83 federal subjects of the Russian Federation (Zubarevich 2011, 1)." In short the Arctic region ashore of the Kara Sea likely has limited to no capability to shape decisions on extraction.

2.2.9 Environmental standards in Russia

Oversight and operations based on alignment with environmental international standards and norms are not a given for Kara Sea development. The 2013 Russian Arctic strategy acknowledges the need to adhere to environmental higher standards and to redress the past misuse of the region. But historically, distinctions that have characterized the Russian hydrocarbon industry are a relative lack of the most-advanced offshore techniques, compared to the best of the IOCs, and a lack of adherence to a steady and consistent legal enforcement standard (Gustafson 2012; Yergin 2012). Transparency International, a highly regarded non-profit international Non-Government Organization (NGO), ranks Russia 119 out of 168 counties in its corruption perception index (Transparency International 2016). The Yamal peninsula on the eastern edge of the Kara Sea, has long been a core gas producer for Russia. Environmental damage by trucks and all-terrain vehicles conducting exploratory operations and production support over the last fifty years have created kilometer wide "tracks" that are easily identifiable from space (Blinnikov 2011). The historic lack of adherence to environmental concerns is a result of inefficiency and instability in the political system in which it operates (Gustafson 2012). In Russia, this is particularly true of smaller companies and sub-contractors where there is much incentive to cut corners:

> …in Russia, while large companies are fairly effective and conscious environmental stewards, it is the projects of smaller Russian companies where problems arise…one of the biggest problems the oil and gas industry confronts today in Russia is the activities of sub-contractors, where performance schedules are often tight and who are incentivized to cut corners while operating in highly vulnerable marine environments….Another problem is that the break-up of vertically integrated companies has led to more outsourcing of project management with oversight becoming very lax (Ebinger, Banks, and Schackmann 2014, 46).

Though documentation is mostly anecdotal, hydrocarbon extraction in Russia has demonstrated a pattern of corruption and short corners cutting on environmental standards, despite what legal stricture might actually indicate. Additionally, it is acknowledged by the Russian central government and Russian corporations themselves, that the most advanced drilling techniques and managerial expertise in the hydrocarbon industry are in the IOCs abroad. Currently these same domestic corporations, such as Rosneft and Gazprom, are undergoing severe revenue retrenchment due to both the sanctions regime and the precipitous fall in the price of oil (2014 to 2016).

Chapter 3 Global influences on Russian hydrocarbon development

3.0 Overview

Hydrocarbon extraction in the Russian Arctic offshore region is not envisioned as a domestic enterprise by the Russian Federation. It will require sustained and significant engagement with foreign industrial and banking enterprises, with an objective of export capital earnings in an international market. Therefore, Russia's ability to engage in an international market successfully will impact the success or failure of its objectives.

3.1 Russia and the oil and gas industry

The international O&G industry has a deep and unique relationship in Russia with many central components enduring for well over a century. As far back as the late 19th century, unlike its oil production rival the United States, Russia was not an industrial giant and needed to import technology and capital to meet even its domestic needs. From these early days, a recurring systematic characteristic of the Russian oil industry is that it expands or opens up to foreign investment and partnerships when absolutely necessary; but then contracts and excludes the very same engagement when opportune, generally prematurely from a strictly production maximization perspective (Goldman 2010). After the truly "revolutionary" Bolshevik nationalization of the hydrocarbon industry, Lenin personally intervened with the development of the New Economic Policy in 1921. The need to expand and to maintain production level became a strategic imperative. The British, Americans, French and Germans returned gradually bringing production back close to pre-revolution levels. Once the oil industry was rebuilt however, the Soviets began to squeeze out foreign concessions. With a few exceptions, including Standard Oil (the corporate origin of ExxonMobil), all foreign concession projects were revoked prior to WWII (Alekperov 2011). Another developing Soviet characteristic was the use of oil production export as a state policy to gain hard currency. Generally, this was an apolitical pattern that would continue into and after the Cold War. For example, though fighting an ideological proxy war against Franco-fascism in Spain to which Germany and Italy were closely aligned, Italy was the Soviet Union's greatest oil importer amounting to about half of all its imports, not being stopped until 1938 (Goldman 2010). By the end of WWII many Soviet

fields had been damaged by the war itself and inefficient practices resulting in production significantly below pre-war levels.

By the 1960s the core oil fields of the time were past their production peak and the Soviets would have to rely on secondary techniques to maintain production. Water injection was only partially successful. Soviet engineers were hampered by restrictions on acquiring the best Western technology and techniques. The foundation of the Russian economy had been dramatically altered by the years of communist rule. Non-renewable extractive industry, primarily oil and gas, had replaced the even more mismanaged agricultural sector as the pillar of its economic sustainability and grip on power (Gustafson 2012).

3.1.1 Historical precedent: the fall of the Soviet Union

Political science accounts of the fall of the Soviet Union often do not sufficiently address the significance of the failure of the O&G industry (especially oil) to expand or even maintain levels of production. But for the current Russian regime it remains a well versed cautionary lesson that weakness in oil production, at a critical time, devastated an inefficient Soviet central state that could not rebound. Zbigniew Brzezinski spoke and wrote early of a coming Soviet collapse due primarily to a fatally abstract and detached communist ideology (Brzezinski 1989). Stephen Kotkin emphasized Gorbachev's failed humanist attempt to turn away from Leninism to reform that communist ideology as the primary causal driver of the subsequent collapse. Gorbachev and his allies believed that the Communist Party could be democratized, but unintentionally undermined the authority of the "Party" and provided the catalyst for dissolution: "The monumental second world [communist] collapse…was triggered…by Communist ideology" (Kotkin 2008, 2). Serhii Plokhy portrays the decisions and events of the time as the most critical factors. Despite Russia's uniquely troubled political and social history, there was no predetermined collapse (Plokhy 2014). But two tools from energy economics, known as the Granger Causality Test and Hubbert's Curve, or "peak oil," lend support to another interpretation for the Soviet collapse, especially relevant for a study on the significance of new hydrocarbon production for modern Russia. Rather than primarily the result of "general" economic stagnation and resulting political devolvement these tools support the proposition that a stronger causality can be identified by the inability of the USSR to maintain planned oil production levels.

By the 1970s global demand for oil had increased, and coupled with the 1973 oil embargo, the Soviets came to be seen in the international markets as no less reliable producers than OPEC. Their production rose to where by 1975 they were the world's largest oil producer. "During this period, Western Siberia was a kind of hydrocarbon Klondike for the Soviet Union....It became advantageous simply to sell raw hydrocarbons for hard currency and then to buy everything the country needed (Alekperov 2011, 310)." But by the end of the decade the Soviet Union struggled to maintain and increase production. It could no longer simultaneously meet its fixed price domestic needs, its geopolitically driven subsidized export to Warsaw Pact allies, and its hard currency export requirements (Gustafson 1989; Yergin 2012).

It can and has been argued that this inability to increase production was due to an inherently weak "command economy" system, Marxist-Leninist ideological imperatives, Cold War directed embargoes on key technologies and trade, and simply inherently "Russian" social pathologies. The centralized bureaucracies were not aligned to any logic of efficiency let alone Western style vertical integration, and had been held together and directed by the Soviet GOSPALN (Central Planning Agency). "For over half a century, the Soviet oil industry had developed in near isolation from the rest of the world (Gustafson 2012, 148)." The larger point though is that these same "inadequacies" were overcome to allow the Soviet Union to regain the position, once held in 1901 by Russia, as the world's largest oil producer. A good perspective would be to view the Soviet hydrocarbon industry as a distinct subset within a global production regime with both internal and external barriers limiting and restricting its interaction and general integration with the larger system or global industry. Paradoxically, that system also had a track record of persevering and weathering short term market cycle contractions.

The Soviet economy was actually strong in the 1980s, but was burdened with a collapsing oil industry even though Soviet investment in drilling increased in the 1970s and early 80s. Capital spending in oil and gas increased 27% between 1980 and 1985 (Reynolds 2011). But it had passed "peak oil" or Hubbert's Curve, which contends that when production has already passed its peak in known reserves the supply of oil will increasingly be unable to meet demand. When applying this theory, it is important to emphasize that, once past "peak oil" *production decreases independent of market demand.* In the 11th GOSPLAN, January 1, 1981,

the need for heavy increases in investment in oil production and investment was acknowledged and allocated *before* the Reagan military buildup and economic pressure from the US. But less oil to export allowed for less foreign currency and less investment for oil production. Concurrent with these developments were the impacts of a reduction in production and oil export to the political stability of the Soviet alliance system in Eastern Europe. By the late 1980s the Soviet Union no longer had the capacity to maintain these fixed contracts, without which, they could no longer "buy off" elites in these countries with low energy prices (Reynolds 2011).

An application of a second tool utilized in energy economics, "The Granger Causality Test" (a statistical tool to test whether "one" time series is useful in predicting another), as applied by Reynolds and Kolodziej, indicated oil production went down before a drop in Gross Domestic Product (GDP). Coal demonstrated the reverse or opposite trend, GDP fell first. In the 1980s, using the Granger Test for natural gas, no production decline occurred as there were no distribution bottlenecks, and no scarcity. Natural Gas did not drive Soviet GDP and proved largely independent of it. Coal can also be demonstrated using the Granger Test to not have been a driver of GDP, but it was also demand driven by GDP, as coal, was primarily utilized for electric and steal production. It rose when GDP rose. Unlike NG and coal, oil is intrinsically significant to GDP, and can be so correlated in the Soviet Union in the late 1980s. Therefore, oil was shown to have determined GDP and coal, but not vice versa (Reynolds and Kolodziej 2008). To conclude, oil production in the last decade of the Soviet Union had reached "peak oil" within a closed system and could not expand. The Soviets had neither the time nor the capacity to institute the changes and integration with global partners necessary to allow for its own survival. The inability to maintain and expand oil production to new reserves, was arguably the greatest causal factor in the Soviet collapse (Reynolds and Kolodziej 2008). It can be debated whether the failures of the Soviet Union's oil industry were the *primary* causal driver for its collapse; but it was clearly a critical variable; and one not distant or abstract to the current leadership in the Kremlin.

3.1.2 Confusion, privatization and reassertion of control

The post-Soviet Russia Federation retained the preponderance of the old Soviet oil industry infrastructure, but nonetheless was poorly positioned in the early 1990s for the O&G

geographic fracturing along the political borders of the new republics. The centralized bureaucracies themselves were not aligned, efficient or vertically integrated (own their entire supply chain) in the Western style. The Russian hydrocarbon industry lacked market mechanisms or expertise to transition to the global capitalistic system. When the Western O&G entered Russia in the1990s:

> They brought with them far more efficient management and advanced technology and radically higher standards of execution, job safety and environmental protection than anything seen in the Soviet Union. Along with the large international oil companies arrived a phalanx of service companies and equipment suppliers and smaller operators, not to mention law firms, financial advisors, management consultants, and other modern missionaries, who promptly set up shop in Moscow, to the fascinated amazement of the Russians, for whom all of this was wholly new (Gustafson 2012, 146).

But the excitement and change did not necessarily generate high profits for Western business. A mix of Russians including former O&G bureaucratic ministers, scientists and entrepreneurs, with or without O&G experience, made billions: "In Russia in the 1990s, risks seemed to be everywhere. An epidemic of violent crime swept over Russian cities, as rival gangs fought for control of the assets pried loose from the moribund Soviet state system (Gustafson 2012 177)." But the privatization "Loan for Shares" frenzy of the Yeltsin years and the collapse of even a superficial semblance of consistent law or regulation obscured an old trenchant reality of doing business in Russia (Hoffman 2011). Regulation and taxes, and direct payoffs to officials and even organized crime, appeared and changed in a predictive fashion; to extract as much profit from the oil as possible. Conoco (later ConocoPhillips) for example, who had invested in Barents Sea development: "…found themselves having to pay 20 different taxes (Goldman 2010, 85)." Additionally, one of their field projects was arbitrarily given to a Russian firm by fiat. Below the threshold of the major IOCs, smaller Western service companies provided the technology that was most valuable for newly privatized Russian oil companies to maximize production in legacy fields. One of the first post-Soviet Russian joint ventures, White Nights, applied Western techniques to fields long past peak production, with considerable success, but not necessarily profit for the joint venture: "By the time taxes were collected (many

imposed just for this occasion), the increased transit fees deducted, and the bureaucrats properly mollified (paid off), there wasn't all that much to share (Goldman 2010, 84)."

In Putin's first two presidential terms (2000-2008) the O&G industry was wrestled back from foreign firms as well as recently risen Russian oligarchs who failed to yield to prerogatives as determined by the Kremlin. The dismantlement of Mikhail Khodorkovsky's rebuilt, and relatively transparent, Yukos oil company was a dramatic example of the latter. It could be argued that the Yukos affair defined the central government's policy: that the purpose of laws and regulation, in general, but for the energy sector in even more so, was to serve presidential administration objectives, not to ensure a level playing field. Laws could and would be bent and selectively enforced as necessary (Gustafson 2012). Western IOCs had to adjust to a changed regulatory regime where the central government and its president were engaged in the details of the O&G business. However, "… the Russian state is not a unified actor, something demonstrated by the competition between national champions (Aalto et al, 2012, 25)."

Foreign investment in Russian oil was reduced as the Russian Federation re-asserted its control. Production Sharing Agreements (PSAs) were in particularly disfavor and seen as a colonial model inappropriate for a world power like Russia, though a few grandfathered projects were allowed to continue. Other measures were taken that made it more difficult for Western firms to operate, even with approved Russian partners, such as a law mandating the details of Russian hydrocarbon reserves be kept as state secrets (Gustafson 2012). In 2006, Russia forced Royal Dutch Shell out of its controlling share of the LNG project Sakhalin-2 after $9-11 billion had been invested. Coinciding with an overall political deterioration between Russia and the West, a law was passed in 2008 forbidding majority foreign ownership of significant ventures in strategic industries (Aron 2013). Thus, the O&G industry in Russia was, and is largely still, characterized by the Russian need for export earnings from hydrocarbons and for Western IOC capital and expertise to recover it. But Russia also has struck a hard bargain. The regained political and economic clout by the Russian Federation since the late 1990s (until sanctions and the concurrent oil price collapse in 2014) was primarily "not" attributable to dramatic improvements in oil exploration or production method. Rather, it was largely the Kremlin's

reclaimed control of the hydrocarbon industry from the private sector, and thus the "rents," as well as the rise in the export price of Russian oil on the global market.

3.1.3 Energy as a geopolitical weapon?

It has been argued that Russian policy under President Putin has used, and intends to continue to use, hydrocarbons, especially gas, as a regional and even global geopolitical weapon: "…after a long period of failure to sustain itself as a military superpower, Russia has emerged---even if inadvertently---as a different breed of superpower, one whose power rests on economics and energy (Goldman 2010, 16)." But dependence, especially by the smaller states on Russia's periphery tied to a fixed NG pipeline infrastructure, also implies Russian *dependence* on the export revenue. Russia needs stable customer demand and has therefore generally followed a more measured energy policy, with specific exceptions (Kaloudis 2009). When economic potential is very high, even major geopolitical rivals can reach accommodation, such as Russian-German energy cooperation on long term NG gas contracts. However, when the economics underlying an energy deal are marginal, geopolitics and internal domestic influences often prevail (Svyatets 2013). New pipeline projects built on long-term contracts to powerful states, like China, will likely allow Russia even less leverage for the primacy of geopolitics objectives over profit.

3.2 Current and future global demand

New investment in very costly, risky, and large Arctic offshore projects is generally more the result of changes in global hydrocarbon market dynamics than a reaction to "new" discoveries. The Kara Sea has been considered a very lucrative region for exploration for a considerable time; geologically the coastal shelf is an obvious extension of the West Siberian plate which has been Russia's greatest productive region for 50 years (Piskarev and Shkatov 2012). A publically released, redacted, 1988 Central Intelligence Agency (CIA) report, *The Kara Sea: A Soviet Oil Resource for the Turn of the Century*, identified almost 30 years ago that: "Western financial and technical involvement in the Kara Sea would be a boon to the Soviet [but]…We believe Moscow would give higher priority to the Kara Sea only in the event that national production begins to worsen dramatically (Central Intelligence Agency 1988, 10)."

Technological capacity has improved a great deal in drilling offshore in harsh ice conditions since that 1980s report, but demand and the Russian need for new reserves changed more.

Relative global hydrocarbon scarcity in the new millennium, especially traditional crude oil, led to increased investment in infrastructure and exploration in offshore circumpolar regions. This holds especially true for the largest, or super major IOCs, which lost control of their biggest reserves to the National Oil Corporations (NOCs) around the world (the size of claimed reserves for publicly traded IOCs like ExxonMobil impacts stock trading price) (Yergin 2009). That pattern, in a sense, began dramatically a century ago in Russia itself with the Bolshevik revolution. Over time, as more readily exploitable reserves pass their peak production and decline, exploration globally expands to previously inaccessible, technologically unviable or otherwise economically unrecoverable hydrocarbon frontier regions such as the Kara Sea. The strategic view of ExxonMobil, as stated by its CEO, is to take on the risk and invest and explore in the present day for global hydrocarbon demand in the future:

> The size of the resource prize has to be large to support the risked capital that has to be put in place. The Arctic is one of the few places left where we believe those opportunities exist.... Because eventually we are going to need it. It's back to that insatiable appetite that the world has for energy. Oil demand is going to continue to grow as population grows...we're going to be at 9 billion people. Something like 3 billion people are going to move from poverty into middle class status. When they do that, the energy demand goes up enormously (Fahay 2015).

Current oil production of approximately 95 million barrels a day in 2016 (International Energy Agency 2016) is expected to grow by 30% and gas demand by 60% to meet this demographic change that will drive increases in discretionary spending, e.g. more cars, refrigerators and air conditioning (Yergin 2012).

With a relative Arctic preponderance of hydrocarbons, Russia is well positioned to take advantage of this perceived shift in the global resource economy. Demand is generally expected to be on a steady rise by the O&G industry, only impacted on the margins by alternative energy and conservation efforts in the more advanced global Western European economies. In view of

the President of Russia's LUKoil, because of the underlying macro-economics, the "first" or "developed" world has lost control of its economic destiny:

> …despite the benefits of a more interconnected world economy, this new era of globalization and development is not without its own consequences. …World energy consumption is growing rapidly, by an average of 20% per decade over the last 30 years…Indeed…if governments continue present policies, global energy demand in 2030 will be 50% higher than it is today. Developing economies will account for 74% of the growth in demand, with China and India accounting for 45% (Alekperov 2011, iv).

3.2.1 Price of hydrocarbons and relation to demand

Writing in 2016, with crude oil prices having precipitously fallen from what had been a several year plateau above $110 a barrel in early 2014, to what has steadied to a $40-45 a barrel range (Investmentmine 2016), the viability of many pioneering Arctic offshore and unconventional hydrocarbon projects has been shaken. Investment strategies based on a $90-110 a barrel benchmark range by IOCs, NOCs and governments in frontier northern offshore regions have been impacted (Koranyi and Fouche 2014). Clearly the "current" or near term price of hydrocarbons influences investment development decisions. Balance sheets matter. But the very long timelines required to progress from exploration to profitable production for massive offshore frontier projects requires strategic analysis. The gamble for the O&G industry is on assessing the future market decades away, as well as the nature of the coming global political-economic system; not the price of a barrel of oil the next quarter.

Current market conditions certainly influence short-term investment decisions and impacts the *capacity* to invest for the long term; but arguably are not the critical uncertainty for strategic planning generally imagined. The O&G industry uses market price in their investment strategies with methodologies like" Monte Carlo" modeling, which contribute valuable detail and directly impact project investment decisions (Downey 2009). The difficulty of oil price forecasting is demonstrated by the impact of interest rate differentials. For example, a rise in US interest rates has been shown to correlate to an appreciation of the US dollar and thereby influence a *lowering* of global oil prices (commonly traded in dollars). But lower interest rates on a global scale also correlates to more available capital for marginal or risky investments in

frontier hydrocarbon projects (Oil and Gas 360 2016). Because of this complexity, at the strategic level, global *supply* of oil not the price, may be a more useful variable to assess. ExxonMobil began focusing on supply as a key driver or variable in their strategic planning as far back as 2000. Forecasting the future price of oil was determined just too volatile a variable to add value. Looking backward from the year 2000 at the Exxon forecast 20 years before (done in 1980) it was evident they had achieved some success in one of the most tumultuous oil markets in the last half century. They accurately projected supply within in one percentage point. But they were off the mark in predicting price:

> They had been wildly off, however, in forecasting oil prices…they had badly underestimated the pace at which technological improvements…would make it easier over time to find new deposits of oil, increasing the global supply and tamping down prices…. geopolitical disruptions played such an important role in the price of oil that normal forecasting based on supply and demand equilibrium was not realistic to pursue (Coll 2013, 306).

Many energy economists argue for the primacy of new oil production from previously unexploited reserves as the causal factor for the sustainability of the existing global economic system. The system model that has brought prosperity to the developed world, and that has offered hope for the less developed, is increasingly unsustainable from this world view. Oil production has already passed its "peak oil" under Hubbert's Law or Curve in most of the world's known reserves and therefore the supply of oil will increasingly be unable to meet demand (Reynolds 2011). Thus a supply shortage of traditionally recoverable crude oil, coupled with the diminishing reserves owned and controlled by the biggest IOCs, like ExxonMobil, who also have the greatest technological capacity, argues that oil exploration and production in new frontier regions like the Kara Sea, over the long term, is more likely to be on an upward rather than a downward trend. But increased efficiency, technique and conservation efforts can flatten and delay the predicted decline cycle.

The Hubbert Curve is a useful contribution for an analysis of Kara Sea hydrocarbon futures. Modern enhanced recovery techniques can and does impact predicted "peaks" and especially the rapidity of decline. But arguably, the real value of the theory is not by providing

mathematical certainty that the world is indeed going to run out of oil, but rather, to accentuate that global oil supply is a better indicator and key driver for planning than is attempting to forecast market price. There are significant other factors that impact hydrocarbon activity, such as national laws, and in some cases, international treaties and regulations. Bridge and Le Billon, in their political economy study, *Oil*, articulate a different world view than that envisioned by many energy economists. They contend that international, cooperative political "suppression" of demand can be a significant variable in the coming decades (Bridge and Le Billon, 2013). Acceptance by 155 nations in the December 2015 Paris Agreement to limit CO2 emissions (attributed to a human-induced component of climate change) lends supports to their argument (United Nations 2016).

3.2.2 Difference in oil and gas markets

Natural gas, unlike oil, is not traded as a global market commodity; rather, it is sold at a regional market price. This is due to the much higher transportation costs incurred. If the demand, the consumer, is not relatively close to the region where the gas is produced, it has been historically uneconomical, generally dramatically so, to transport, unlike its much denser crude oil cousin which has been shipped around the world at very competitive cost for a century. Pipelines are used to transport NG within regions. These pipeline networks have been the backbone of Russia's energy exports in Eurasia. But pipelines are highly capital intensive and non-mobile. Both producer and consumer are bound with significant sunken investments. Therefore, the price of NG, unlike oil, can be dramatically different across the globe. The NG market also remains constrained by long-term supplier-consumer contracts to protect the investments on both sides of the market chain (Yergin 2012).

Liquid natural gas technology and its growing markets, in theory, offers an opportunity for Russia to broaden gas exports to a global consumer base and a global market outside of a regionally fixed pipeline system. New LNG supplies have added uncertainty to the market, and: "Markets will remain segmented, with prices fluctuating from one region to another and this will stimulate world LNG trade (International Gas Union 2014, 5)." Natural gas meets 25% of global energy consumption, and of that, 10% is met by the LNG market (LNG thus accounts for 2.5% of current global energy demand). The LNG share of the gas market has been steadily

growing. Qatar by far is the current world leader in LNG exports with a 77% (Russia's is 10%) market share though Australia is projected to take the lead by the end of the decade based on new projects (International Gas Union 2015). But the global LNG market is also largely one tied to long-term contracts just like the regional NG pipeline market. The physics and the costs of the required transformative energy process (from NG to LNG and back to NG) will likely prevent LNG from ever truly paralleling the market liquidity of oil:

> …Liquefaction is a process of super-cooling the gas into a liquid state at minus 260 degrees Fahrenheit which condenses its volume to one six-hundredth. LNG tankers, which are insulated so that the LNG stays cold, can then crisscross the world's oceans like oil tankers and transport the natural gas to any destination on the globe. Once the tanker arrives at its port of call, it unloads the LNG. The gas is then heated up to ambient air temperature, re-gasifying the liquid into natural gas. At this point, the natural gas is injected into pipelines and sent to wherever it's needed. This has allowed vast reserves of stranded conventional natural gas to become economically available to world markets (Reynolds 2011, 164).

Offshore success in the Kara Sea very likely will be based on the proven quantity, density and marketability of its *crude oil*. There is every indication that its gas reserves are vast even on a global scale. But there are also high quantities of gas available around the world, and regionally on or near offshore the Yamal Peninsula, which can be produced for many years at less cost. However, continued investment and success in the Yamal hydrocarbon LNG project could lead to the creation of a supporting infrastructure that could reduce the cost of Kara Sea oil extraction.

3.2.2.1 Impact of non-traditional recovery

The shale oil and gas fracking innovations, as well as other non-traditional recovery methods that have manifested in the North American hydrocarbon industry within the last five years are dramatic in the short term, and are widely believed to have significantly contributed to the market price collapse of oil in mid-2014. Though the supply "glut" the last two years has significantly hurt stability and investment in LNG projects; as well as new North American wildcat and exploratory drilling, once in production, those operations have proved more resilient

and cost effective than initially expected. For the long term though, other factors are more likely to impact the spread and success of these techniques globally. At least in Europe, the geological potential for gas fracking is not optimal. In general, shale hydrocarbons "plays" are smaller, deeper and with less favorable clay content (Stevens 2012). In addition, there has been strong NGO and domestic political opposition that has contributed to the curtailed planning of major projects within the EU. Another long-term potential of continued buyers' market (relatively inexpensive) "gas" (NG and LNG) is for it to undermine the political will to invest in more expensive alternative energy sources, such as solar and wind. It is significant to note that non-traditional hydrocarbon techniques have much shorter production cycles (longevity) and lower Energy Return on Investment (EROI) than traditional methods. Booked reserves susceptible to traditional crude oil techniques will remain the gold standard for the O&G industry for that reason.

3.2.3 Transportation costs

The great value of crude oil, and why it has been the supreme energy source for the *global* economy for the last century, has been its EROI, and especially so, for the cost component of transporting it globally to market. Coal and NG are both much costlier, outside of their region of origin, to deliver to the consumer. The core physics underlying the logistics of transport has yet to be surmounted by economically viable technology, and very likely never will. But the LNG market offers new mobility and opportunity to exporters and importers of gas, though it is difficult for LNG to compete in geographical regions which have their own NG reserves and production.

Once delivered via LNG tanker to the consumer, generally, LNG processing plants pipe the reconverted NG into a *fixed pipeline* grid to distribute out into the regional market. However, strategic security reasons, not just market economics, induce some large industrial nations with high energy import requirements, e.g. Japan and China, to seek diversity in supply. Over short distances onshore pipelines of NG economically outperform offshore NG pipelines; both *outperform LNG transformation + transport out to a distance from production to customer of about 2,000 to 3,000 miles* (depending on diameter of the pipeline) as Figure 3.1 below demonstrates.

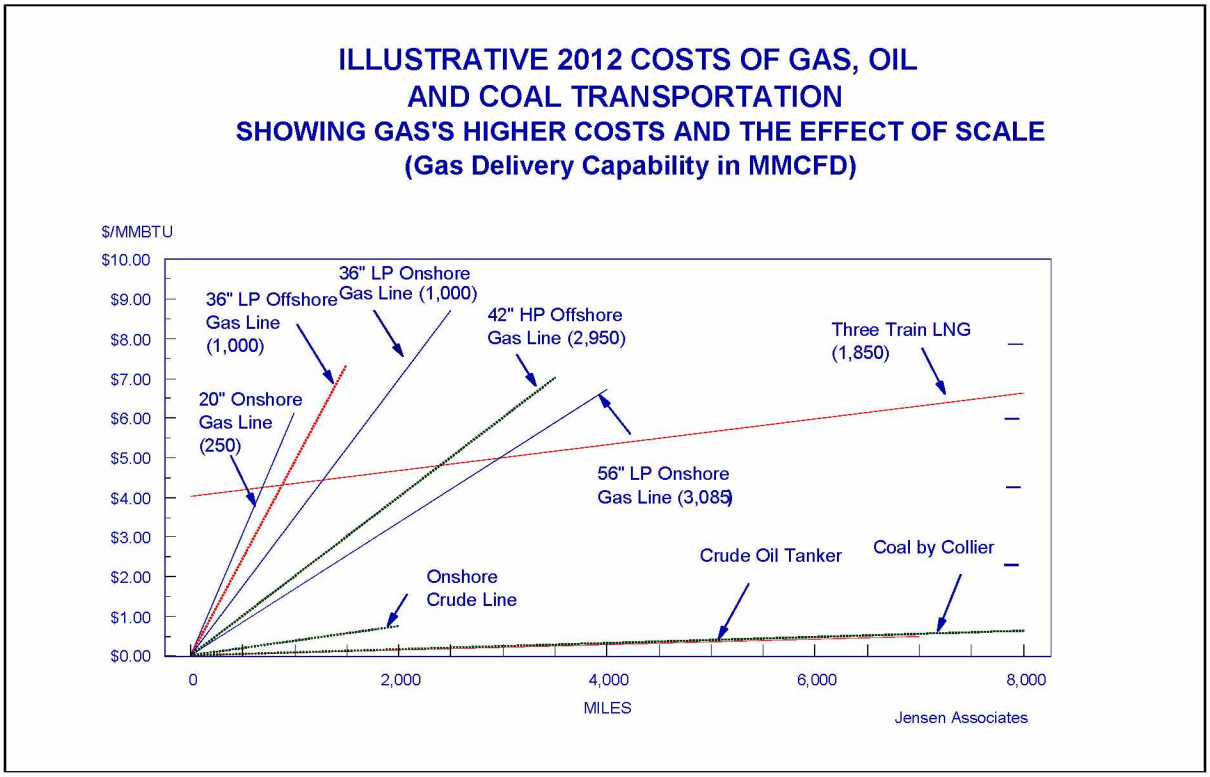


Figure 3.1 Transportation cost comparison

Source: JAI-Energy, 2012, slide provided directly by creator, James Jensen. Copyright permission granted (Appendix C).

3.2.4 Regulatory environment for IOCs in Russia

International Oil Corporations operating in Russia have much experience in a difficult regulatory environment. ExxonMobil's earlier experiences as an operator with Rosneft in the Sakhalin-1 project go back to the 1990s, at the time the most complex project the corporation had ever undertaken, and one they were legally muscled into renegotiating in Rosneft's favor. Currently, ExxonMobil has a pending lawsuit against the Russian central government claiming it overpaid over $500 million in taxes. That case is expected to be heard no sooner than 2017 (RT News 2016). Shell, BP and ConocoPhillips also have all had contracts "restructured" or "renegotiated" since the 1990s, sometimes at great loss under Putin's reign, but they still remain

or return and continue to invest.

3.2.5 Corporate social responsibility

International Oil Corporations, with diverse shareholders and national compliance standards, are susceptible to adverse international or domestic opinion from an oil spill or any other environmental mishap in the Arctic. Populist opinion or legal directives from IOC host countries could continue to limit or prohibit continued participation in Russian JVs in the Kara Sea or other frontier hydrocarbon regions. These influences on IOC practices have emerged in the last 20 years, and are outside traditional O&G business practices or diplomatic statecraft:

> Increasingly shareholder value is tied to a company's performance on environmental and social grounds: the BP Deepwater Horizon explosion, for example, decreased the market valuation of BP by [U.S.] $100 billion…The business of producing oil has been increasingly entangled with broader social issues like climate change, human rights, and financial speculation (Bridge and Le Billon, 2013, 62).

An IOC's environmental record can impact competiveness in acquiring new licenses. Corporate Social Responsibility (CSR) standards are now integral to operational planning at ExxonMobil and the other major IOCs as well as acceptance of the Extractive Industries Transparency Initiative which seeks, especially for the poorest and less developed hydrocarbon exporting states, to allow more political transparency of the uses of earned revenues from IOC extraction (Coll 2013). Therefore, international opinion as well as domestic in specific populations where IOCs are based, could significantly limit their continued participation in Russian projects to include the Kara Sea.

3.2.5.1. If disaster strikes?

Negative environmental impacts of a hydrocarbon extraction mishap in the Kara Sea or other Arctic offshore regions would likely have international political ramifications independent to a degree of actual quantifiable environmental degradation, e.g. a massive oil spill. Failure by the Russian state and O&G industry to mitigate damage to what is a fragile and critical Arctic

habitat, would likely render hydrocarbon extraction in other frontier regions, significantly more difficult for IOCs as well as for Russia. The responsibility for administering and developing the response plans for oil spills in Russia falls to the Unified State System of Emergency Prevention and Response (USSEPR). It is expected that industry operators have contingency plans in place. Should their plans fail to contain an incident, the Ministry of Emergencies would initiate their own contingency plans. Russia's capacity to handle a major Arctic hydrocarbon mishap on its offshore Arctic shelf is generally assessed as not robust: "…available resources are insufficient for adequate and rapid response to emerging threats and risks in the Arctic region (Bambulyak, A. Syndes, and M. Syndes 2015, 82)." However, the same assessment would likely hold at the time of this writing (2016) in most every other potential circumpolar hydrocarbon extraction region. The distances are vast and the infrastructure is "currently" woefully inadequate for responding to offshore emergencies among all the littoral Arctic nations, with the possible exception of Norway, which benefits from less severe oceanographic and meteorological conditions and a more concentrated, overwhelmingly sub-Arctic offshore enterprise. What will likely matter is the character of steps taken to mitigate hydrocarbon extraction risks before a response operation is necessary. Short of central leadership survival, such as a regime threatening war, a major hydrocarbon environmental disaster could likely be a showstopper for a significant period of time. In that unfortunate event, it would be probable that Russian authority would retain sovereign control to any disaster off its shores within its EEZ, to a greater extent than other AC members, even if it increases the likelihood of negative impacts for its own people, e.g. the 2000 Kirov submarine disaster when foreign deep sea recovery assistance was refused. It would be out of character if Russia did not seek to control every aspect of any mitigation efforts within its territory, with high importance given to avoiding regime embarrassment to an even greater extent than is the norm for sovereign states. Responsibility and accountability for environmentally safe practices in offshore hydrocarbon extraction is also not solely a Russian matter as foreign IOCs are integral to the success of their Russian partners. British Petroleum's 2010 disaster in the Gulf of Mexico demonstrated that there is measurable leverage on IOC activity, and therefore, leverage on their operations wherever they operate, to include the Russian offshore.

3.3 Arctic strategies

Though international forums, NGOs and a shared global environmental consciousness have had increasing influence on offshore hydrocarbon extraction plans, sovereign states remain the most important policy actors in the Arctic. Though there is a long history of exploration, strategic military positioning, resource extraction and regional commerce, the Arctic's relative priority in national strategies is relatively new. This has been highlighted by Russia, the US, Norway and others releasing "Arctic" specific policy documents and policies. A security "perception" of threat is a component shared by the Arctic nations, including Russia, the US and Norway, but it is a broader more holistic concept, more inclusive of the social and human aspects of security in the Arctic region (Hoogenson Gjørv and Goloviznina 2014), than the Cold War construct. That is not to conclude that traditional realism and competition between nation states is antiquated, only that it is not emphasized in the strategic documents.

Table 3.1 Comparative Arctic priorities as evident in respective current strategy

Arctic strategic priorities			
	Russia	**US**	**Norway**
Strategic defense	Med	Med	Low
Sovereignty	Med	Med	Med
Security: law-safety-domain awareness	High	High	High
Regional people	Med	Med	High
Indigenous people	Med	High	Med
Environmental stewardship	Med	High	High
Resource extraction	High	Med	High
Russia: Strategic Development of the Arctic Zone of the Russian Federation and the National Security, 2013. US: National Security for the Arctic Region, 2013. Norway: New Building Blocks in the North, 2009. Comment: Clear in the above comparison is the similarity of declared Arctic policy objectives.			

3.3.1 Russian Arctic strategy: cooperative security or strategic zero sum game?

Energy, particularly offshore hydrocarbons and the need to expand development, is the strategic centerpiece of Russia's Arctic 2013 strategy (Chapter 2) and also influences discussion of other priorities, such as economic hardships endemic to its indigenous peoples. Cited as key factors influencing socio-economic development are; the harsh climate, localized nature of industrial and economic development, dependence on other regions for supplies, and instability in the Arctic ecological system. The main "risks" in the social sphere are the effects of negative demographics, poor social support services and the low quality of life of the indigenous peoples. As means to improve its Arctic social and economic development, state support of infrastructure development and resource extraction, is very much at the top of the list.

3.3.1.1 Russian strategy and international cooperation

Strategic policy for the Russian Federation's Arctic Zone (or region) is outlined in documents signed by the President. These strategy documents are central to the strategic planning of the central government and are approved by the Russian Security Council, which consist of the key state leaders, including the President, Prime Minister, Ministers of Defense, Interior and Foreign Affairs, as well as key directors, such as the FSB (legacy successor of KGB) (Zysk 2010). The energy-specific detail in the current Russian Federation Arctic strategy likely benefited from a lesser Ministry of Energy strategy that candidly recognized the disproportionate dependence on energy exports (Energy 2010). The Presidential Administration has by far the most influence on strategic objectives with limited direct input from the Ministry of Natural Resources, however, the major O&G firms have their own access to the President's inner circle and therefore a means to advance their interests (Laruelle 2014a).

The modern post-Soviet "era" for Russian Arctic policy is considered to have begun well before the USSR's actual demise, by Gorbachev's 1987 Gorbachev Murmansk speech, in which he proposed six cooperative goals for the Soviet Union's Arctic policy (Gorbachev 1987). The 2013 Arctic strategy document, *Strategic Development of the Arctic Zone of the Russian Federation and the National Security*, is an update from the 2008 Arctic strategy, *The Foundations of Russian Federation Policy in the Arctic until 2020 and Beyond* (a short redefinition of the Arctic Zone was released in 2014). Both the 2013 and 2008 Arctic strategies

continue a softening trend with less of the Soviet style bombastic nationalistic tone. Russia's traditional strategic geopolitical security interests are detailed sparingly. It is a forward looking document covering a broad range of security, social and economic objectives: "Implementation of the Strategy will provide a comprehensive building [of] competitive advantages of the Arctic zone … in order to strengthen the position of the Russian Federation in the Arctic…as well as increased international cooperation (Strategic 2013, 22-23)".

Though active and accepting of the AC's eight member states, Russia views the maritime Arctic, in a legalistic sense, foremost a sphere of the five littoral Arctic States (itself, US, Canada, Norway and Greenland-Denmark). There is a noticeable maturing of Russia's vision for developing its offshore Arctic oil and gas reserves in the 2013 strategy. Whereas in 2008 it intended to "initiate…the process of mastering natural gas and oil reserves in the Arctic zone (Foundations 2008, 100)," by 2013 there was an acknowledgement that Russia does not have the means internally to exploit its Arctic offshore hydrocarbon resources, implying they must seek assistance from abroad. In 2008 a necessary implementation step, set for 2011-2015, was the: "…delineation of the internationally-recognized exterior border of the Arctic zone…and realization on this basis…the competitive advantages of Russia in the extraction and delivery of energy resources (Foundations 2008, 105)." In the newest strategy, discussion of international borders has been reduced, likely influenced by the 2010 maritime delimitation settlement for the Barents Sea with Norway (Larulle 2014a). There is a clear overall cooperative tone in the 2013 strategy. Enhancing participation in international scientific and regional forums is stated as an objective, as is recognition of the impact of climate change. Looking beyond sovereign borders Provision 17 highlights the need for bilateral and multilateral cooperation in the region to further Russia's objectives:

> ….a) [by]providing a mutually beneficial bilateral and multilateral cooperation between the Russian Federation and the Arctic states on the basis of international treaties and agreements… increasing the efficiency of foreign economic activity; b)…protect[ing] Russia's national interests and implementing acts under international rights of the coastal states in the Arctic region, including issues relating to the exploration and exploitation of the resources of the continental shelf…(Strategic 2013, 15-16).

3.3.1.1.1 Russian cooperation in the Arctic

Russian cooperative engagement with Arctic nations on issues specific to the Arctic has been significantly more conciliatory than on geopolitical issues elsewhere. Even in the darkest days of the Cold War, in specific regulatory spheres, such as Arctic fisheries management and scientific endeavors, cooperation between Arctic states (including the US) were tangible and identifiable. This characterizes the "Putin era" as well, evidenced by agreement among the Arctic states to utilize the AC to facilitate the 2011 Arctic SAR (Russia and US co-led) and the 2013 Arctic Oil Spill and Response Agreement (Russia, US and Norwegian led).

In addition to the AC, Russia is also an active member in the Barents-Euro Arctic Council (BEAC) as well as in Barents 2020, where it has generally worked in a more cooperative and conciliatory manner than in broader "global" international forums. This is arguably because areas of contention such as sovereignty claims, strategic military issues, economic or energy policies are excluded as are active and full participation by nations outside the Arctic and Barents Sea regions (it should also be noted that the charter of the BEAC does not encompass any offshore zone). Unlike the AC however, the BEAC is inclusive of collective component layers below the central state, and therefore, in theory, can influence collaborative norms in those lower layers of government. The collaborative Norwegian and Russian Barents 2020 project, which focuses on uniform Arctic offshore hydrocarbon technical environmental and safety standards operating in the Barents Sea, may have more promise for influence Arctic wide, in part by the specificity of the industry standards approach (Nesheim 2012).

Russia had also consistently supported the legitimacy of United Nations Convention on the Law of the Sea (UNCLOS) as the means to resolve Arctic sovereignty disputes and participated as well with the other four Arctic littoral states, in the signing of the 2008 Illulissat Declaration committing to diplomatic resolutions under the provisions of UNCLOS in the Arctic Ocean. Russian cooperation, in specifically Arctic affairs, has generally held up even after the downturn in Russian relations with the West over geopolitical differences resulting from the Crimean, Ukrainian and Syrian crises; though negative impacts on exchanges and collaboration are obvious.

3.3.1.2 Russian concepts of security in their Arctic strategy

For Russia, long before there were specifically crafted strategy documents, the Arctic has been a core strategic interest and not simply a peripheral or tangential region of concern. Nearly half of the circumference of the Arctic Circle is a Russian coastal and maritime zone; and that zone is being impacted by climate change trends creating both a perception of economic potential and an increased security threat (Zysk 2011). While "security" is typically at the forefront of US strategic policy, for example, the US *2013 National Strategy for the Arctic Region,* line of effort 1 reads: "Advance United States Security Interests (US President 2013, 2)." In Russia's 2013 Arctic strategy however, security it is not discussed until well into the text, and then primarily phrased in terms of sovereignty, similar to the Canadian concept. Strategic military deterrence is buried deep in the body of the text of provision 18- b. The 10 Russian coastal SAR stations alongside Russia's NSR which has been heavily reported in the press, is of little "strategic" military concern to the balance of Arctic power. This type of security rebuilding can also be seen as more of a positive development for safe Arctic transit, emergency response as well as contributing to more environmentally sound resource extraction.

Adjustments in Russia's Arctic strategy over the last 15 years have evolved to a significantly more cooperative international approach. But these changes have taken place in a relatively short period of time and it is not established that they truly reflect a revised vision of Russia's place in the world (Zysk 2011). Foreign policy actions and statements from the central government since 2014 indicate they may be merely tactical in nature; temporary maneuvers aimed at achieving old and new goals with different tools. There is substantial reason to believe that Russia's top leadership hold a strategic view, that Russia's path to remain a global power is through maximum exploitation of its natural resources, especially oil and gas. To exploit those resources is the primary objective. There is a nuance however, that makes this ambition different than the Cold War. Though increased revenues, in turn, increases military potential and capacity, it is not clear that an all-powerful military is the desired end state. More apparent is that the Kremlin views "power" or Russian Federation "state capacity" derived from its Arctic hydrocarbon reserves as enough in itself. In this view, Russian strategy in its core essentials is not far removed from the constants of a traditional "realist" global power struggle; however,

unlike the USSR of old, Russian strategic objectives are not ideological or necessarily military driven ones.

3.3.2 US Arctic strategy

Over the last decade the US Arctic strategy has evolved to better align and focus all aspects of national policy with a more synergistic Arctic focus. President Bush's *Homeland Security PD 25 & National Security PD 66: Arctic Region Policy*, released before he left office, was a step towards this governmental synergy (previously "Arctic" specific policy was largely seen as a research guidance matter). This was followed by President Obama's 2013 *National Security for the Arctic Region* and the *Implementation Plan* in 2014. The US's strategic documents are developed in an interagency process which drives the development of supporting strategies and implementation plans throughout government. For example, the *Military Strategy of the United States* is derived from the *US National Strategy* which in turn guides a series of supporting, programmatic and distribution of funds directives that have a very real and direct impact on what weapons are actually procured.

This regional focus to frame a matrix of Arctic specific issues by a series of strategic guidance documents is a new approach for the US. Though the Arctic has long had great geostrategic significance, it has not necessarily been a distinctly Arctic specific "regional" one. During the Cold War the US invested greatly in Arctic nuclear strategic defense infrastructure as part of its containment policy of the USSR. However, it did not consider its Arctic coast necessitated the same investment in conventional maritime or tactical forces. Polar ice and climate was thought more than sufficient to contain Soviet expansion. Preeminence during the Cold War was placed on strategic aerospace and submarine launched missile deterrent strategies that essentially bypass the physical limitations of Arctic operations by making use of other spatial mediums (Antrium 2011). It is worth noting that strategic nuclear war plans, preparation, and real world posturing are still key components of the national defense strategy for both Russia and the US; though they are discussed less. From a "security" perspective, what is clearly discernable in the last series of US Arctic strategic documents is much greater emphasis on the specifics of the region as distinct, from what for the US, must remain a truly "global" vision. Unlike Russia, and certainly Norway, the US's center of gravity is the world; and not specifically

hinged on the "North." Nonetheless, there are key lines of effort that can be much improved by developing synergy in US policy for the region. The prominence of the Arctic as a "region" for US policy is also illustrated by President Obama's participation in the 2015 GLACIER conference (the first visit by a sitting president to Alaska), meant to highlight the importance of climate change and the role of the AC and international community in buttressing the coming Paris Accords coming later that year (Welch 2015).

All three of the framing "lines of effort" for US Arctic policy, security interests, stewardship, and international cooperation, emphasize soft security issues and awareness of the specific environmental conditions of the Arctic in a regionally collective manner. Significantly, it also highlights in a "public" document accession to UNCLOS (long stalled in the US senate) as an objective (US President 2013). The 2014 Implementation Plan emphasizes the building of a collective international array of infrastructure improvements in communications, functional knowledge based systems such as domain awareness --- as enablers for environmentally sustainable resource use (to include hydrocarbon extraction) (US President 2014). The key points detailed are to improve security by preparing for increased activity in the maritime Arctic: by enhancing Arctic domain awareness with a better communication infrastructure: international cooperation (especially through the AC); adjudicating boundary issues; international scientific cooperation; maritime transport and safety implement a mandatory polar code through the International Maritime Organization (IMO); environmental protection; and economic development to include hydrocarbon extraction. The US Navy's Arctic Roadmap 2014-2030 also approaches security in an all embracing manner anchored in the specific geography of the Arctic (US Navy 2014). What none of the US Arctic documents provide is a framework for unilaterally addressing any concerns with Russian development of its offshore hydrocarbons in the Kara Sea, or anywhere else: declaratory US intent is to work regionally and internationally to address such issues.

3.3.3 Norwegian Arctic strategy

Norway has the good fortune of benefiting from a relatively "friendly" Arctic climate due to the warming effect of the Gulf Stream. Permanent ice is far from shore and hydrocarbons closer to markets than Russian offshore areas such as the Kara Sea. It also has the good fortune of a relatively well developed educational base and a historical economic infrastructure in its

Arctic region that predates hydrocarbon development. Norway's current Arctic strategy, *New Building Blocks in the North*, 2009, updates the *High North Strategy* of 2006. More than any other nation: "Arctic affairs are an integral part of Norway's foreign policy (Hønneland and Jensen 2015, 462)." Norway's concept of "arctic" is also a more geographically regional concept than Russia's strategic concerns for a continental littoral or the US's matrix of concerns and issues which are essentially framed in terms of their global or universal import. For Norway, the focus for its strategy is its own "High North," (essentially a domestic term and focus); the relationship with its Russian neighbor---particularly in regards to the shared border region of the Barents Sea; and the international promotion of high standards of environmental stewardship.

Norway details seven strategic priorities: develop knowledge about climate change and its environmental effects; improve maritime monitoring and emergency response; promote sustainable use of offshore hydrocarbon resources; promote offshore business in Norway's North; infrastructure improvement in the North; exercise sovereignty while also strengthening cross border cooperation with Russia; and safeguarding Northern and indigenous cultures (New 2009). Region building for Norway has been much more a theory; it has been integral to its approach to all aspects of international policy, especially with Russia, and especially in the region of its shared maritime border in the Barents Sea. In addition to continuing to emphasize the AC, BEAC and an emerging Arctic Economic Council, as the core institutions to address its multinational objectives, its Foreign Ministry has also recently outlined a follow on to Barents 2020, a new Arctic 2030 (Norway's 2014). Norway also is working on developing international standards for petroleum operations in the Arctic and expanding its effort on space based communications in high latitudes (75 degrees North). Unlike the US or Russia, for Norway, the Arctic and hydrocarbon strategic policy, in a sense, is its "foreign policy."

3.3.3.1 Effectiveness and limits to Region Building

"Region Building" has provided a common conceptual base, especially by Northern Europeans, to address concerns with Russia in the Arctic and is central to Norway's Arctic policy. Region Building concepts are also implied and encouraged in US Arctic policy. From the perspective of this dissertation's focus on Russian offshore hydrocarbon development on the Kara Sea, engagement with Russia at levels below the state to state stratum is highly relevant,

though not perhaps to the same extent as the Russian projects to its west in the Barents Sea where a maritime border is shared with Norway. As discussed previously, Region Building efforts have been of special notice in the Western Arctic since the end of the Cold War. Writes Lassi Heininen in the *Arctic Human Development Report*: "…the collapse of the Soviet Union permitted a dramatic change in the circumpolar North …When we include cooperation in environmental protection, indigenous peoples' affairs and science, this trend can be described as region building (Heininen 2004, 209)."

It could be argued that Russia perceives itself as the de facto dominant player, exclusive of non-regional rivals, and therefore champions the role and functions of the AC and BEAC. Also, neither the AC nor BEAC are chartered to engage on energy or security policy, which might be another reason they are the forums of choice for Russia to address Arctic matters, rather than the United Nations (UNCLOS process being an exception). However, Russian participation in these regional forums can be subdued. Bjorn Hassler describes lassitude, in his study of Russian participation in a collective aerial reconnaissance monitoring regime for oil spill violators in the Baltic which resulted in the expenses falling to the Swedes, Germans and Poles (Hassler 2011). Writes Elana Rowe a Norwegian researcher:

> In the cooperative settings that continue to flourish, Russia is not an active agenda-setter and remains primarily oriented to the safest zones of low political cooperation and coordination. The reasons for this low-key engagement may be that these regional multilateral arrangements are not seen as prestigious forums….and more generally, because Russian representatives tend to be skeptical about the possibility of achieving desirable outcomes in any multilateral setting. Furthermore, such northern cooperative forums, more or less, explicitly exclude politically and economically problematic issues (Rowe 2011, 3).

The focus of these geographically exclusive forums is collaborative Region Building or "constructivist" policy agendas to establish environmental controls, safety and scientific study. But the Kara Sea shares no international borders. Therefore, it would be difficult to imagine for this exclusively Russian region, open and collective participation by an international element; perhaps even harder to duplicate as a cross level entirely domestic one. There are other limits

though to what can be expected from cooperative and collective approaches to matters of great importance to Russia, especially within its borders. Russia is the predominant power, certainly in the Euro-Asian sphere of the Arctic, and demonstrates little intent to restrict unilateral action at the core of its interests, though recognizing that interdependence in the Arctic region is both defined by global economics and geography. In an information age update to their global interdependence neoliberal theory, Keohane and Nye, identify two areas where interdependence had not seen much change; and likely still has not:

> Military force still plays a significant role in relations between states, and in a crunch, security still outranks other issues in foreign policy…the world of states is not a world of complex interdependence. In many areas, realist assumptions about the dominance of military force and security issues remains valid (Keohane and Nye 1998, 3).

Region Building's effect on Russian policy for the Kara Sea is therefore likely to be marginal. Hydrocarbon extraction policy choices in the Kara Sea are likely to remain a Russian strategic level concern for the very top of its central leadership.

3.4 Sanctions and direct policy action

The potential for influencing the character of Russian Arctic offshore development by leveraging Russia's lack of capacity is evident. That Russia needs foreign technology and investment to succeed, and that it is a component of its Arctic strategy, is significant. But transforming lack of Russian capacity into international policy leverage will be complex as it is IOCs that have the desired capital and technology, not governments. The current sanction regime established in 2014 by the US, Japan, Norway, Switzerland, the EU and other nations, have targeted the Russian oil and gas sector as a means to induce different Russian foreign policy choices for Crimea and the Ukraine; *not for a sustained and sound Arctic hydrocarbon development policy.* The sanctions implemented by the West are a direct action impacting Russian energy policy *for a global geopolitical purpose; not a specifically Arctic one*. Nor are they economic embargos that negatively impact Russian offshore oil projects in a general way; they specifically target those projects. Hit by US sanctions (and thereby prohibiting engagement by any corporations or individuals subject to US law, e.g. ExxonMobil) are Russian O&G corporations, specific individuals and banks/investment firms. The list includes: Rosneft and its

CEO; NOC rivals Gazprom, LUKoil, Surgutneftgas; and major banks such as Sberbank (US Treasury 2014).

> Initially, the drilling of the first Universiteteskaya well [Univeristy-1 in the Kara Sea] slipped through sanction restrictions because all the equipment had been contracted before the August 1 deadline [2014]; but the loophole was closed…on 12 September….Those new orders introduced a series of tougher sanctions that appeared to be aimed at undermining the future development of the Russian oil sector ….In particular, it tightened the rules on US company involvement of projects involving the development of resources in the Arctic, deep-water offshore…and shale oil….Furthermore, US companies were given a 26 September deadline to cease all activities in areas identified (Henderson and Loe 2014, 33).

To that point, sanctions in September 2014 shutdown Rosneft and ExxonMobil's JV in the Kara Sea. Russian critical need for capital investments, technology and management expertise from abroad to develop its reserves of Arctic hydrocarbons have been enduring and will likely remain so. The potential for Western sanctions to target the Russian hydrocarbon capacity in the offshore Arctic was not a historically unique event and should not have hit the Russian leadership as a total shock. Similar reactions to Russian - Soviet foreign policy, especially by the US, is within a historical pattern. Thirty-five years ago offshore Sakhalin Island drilling in the Pacific sub-Arctic was targeted by US sanctions:

> …the project proved vulnerable to US sanctions in 1981-2, because of the large component of American technology. The sanctions seriously reduced drilling capacity…from an expected five wells with an American drilling ship to two with a Soviet replacement vessel (Østreng 1987, 25).

European Union sanctions also focus on Arctic, tight oil and offshore O&G projects but differ in detail. Any EU company or investors must also cope, like US firms, with the possibility of a continuation or expansion of sanctions. At a minimum, the sanction regime has created great investment instability. "As a result it would seem that any Arctic activity planned by European companies with Rosneft or other Russian partners is unlikely to proceed any more rapidly than Exxon's undertakings in the Kara Sea (Henderson and Loe 2014)."

Russia has and can be expected to continue to attempt to mitigate the impact of sanctions. One such aspect has been the recent compensation of the corporate and banking "victims" of the sanctions. And unlike 2008 or the late 1990s, the Russian central government in 2014 was in a stronger position, with fiscal reserves of near half a trillion dollars as well as having a more developed business acumen (STRATFOR 2014). Nonetheless, Russian fiscal reserves have been rapidly dissipating. The impact of sanctions on Russia's energy sector, coupled with the continued drop in the price of oil led to official recognition of a recession for 2015 by the Russian Finance Ministry (Abromov 2014). The recession continues with Russian GDP contracting 3.7% in 2015 (Tully 2016b).

Indications are, as should be expected, that Rosneft with support from the central government will continue efforts without its US current JV partner, ExxonMobil if necessary, seeking other partners. A shift to partners in China or Venezuela, for example, has featured heavily in the press. But ExxonMobil is generally considered the most proven of the super-major IOCs in bringing together the best in technology and management for the world's biggest industrial projects (Coll 2013). Therefore, if sanctions curtail ExxonMobil's long-term commitment to Russian offshore joint ventures, there should be a discernible negative impact, even if mitigated by other IOCs or even NOCs. The capacity of alternative hydrocarbon industry partners to replicate the Western super-major IOCs in Russian Arctic extraction objectives, in a sustained sanction regime, is a critical uncertainty for the midterm.

But the desirability to invest capital and effort in Russia by IOCs has been historically driven by relative global scarcity of *marketable* hydrocarbons elsewhere; and still remains the case. Russia has a critical need for investments from abroad to develop its reserves of Arctic gas and oil as its capacity for government assisted funding has declined; and it also needs specific high technology. But this leverage should not be overstated. Russia has experienced sanctions, state collapse---and going back further, revolution, genocide, invasion, extreme tyranny---and throughout that hundred and twenty years or so the international O&G industry has been in, out, in, and out again. There is not sufficient evidence to conclude that pattern will not re-establish in a recognizable form.

Chapter 4 Methods, tools and research components

4.0 Overview

This dissertation incorporated three different tools to address the complexity of the research questions. After an initial literature review and strategic policy analysis, a survey-interview of experts was designed to narrow identification of key drivers and critical uncertainties to those most applicable to the development of Russian Arctic offshore hydrocarbons and the Kara Sea. Supporting research and academic engagement continued in concert with the execution, processing and analysis of the survey-interview. A dedicated workshop was also added to the research process. This workshop conducted at the University of Alaska Fairbanks, with over 30 participants, explored key drivers circumpolar wide, as a supplemental and external input to assist in the creation of four plausible futures for Kara Sea hydrocarbon development. The flow of the complete PhD research program is represented by Figure 4.1 below.

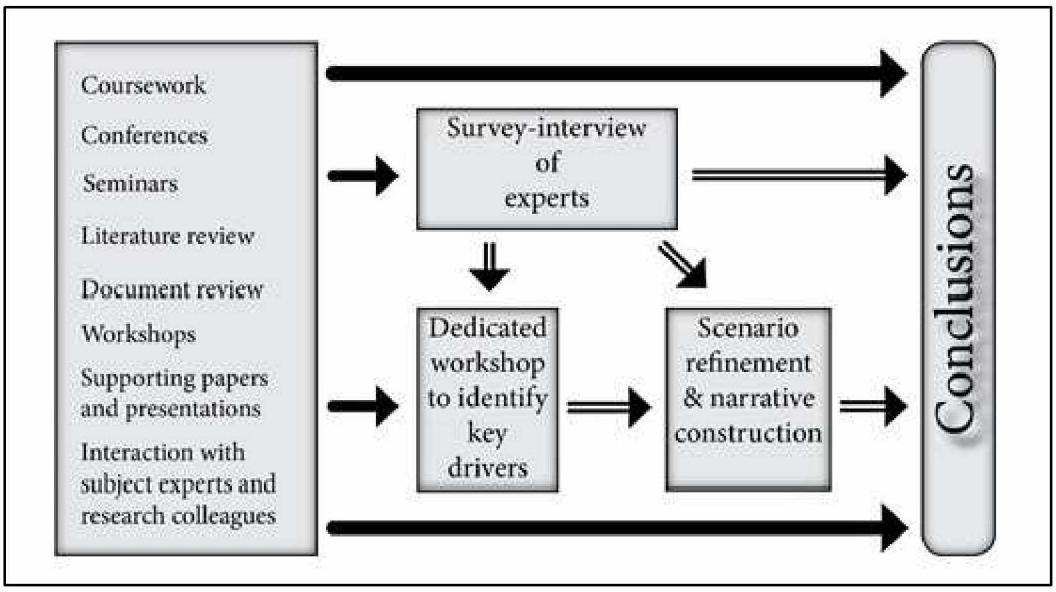


Figure 4.1 PhD research program flow chart

4.1 Qualitative methods

The overall research approach was *qualitative* for a *holistic* interdisciplinary study (Creswell 2014). The intent was to identify and differentiate between key drivers and critical uncertainties and then to build plausible future scenarios for Kara Sea hydrocarbon development.

These scenarios were designed to allow different drivers to interact in structured, complex, but plausible narrative futures. A geographically delimited *intensive research design* was used to ground, isolate and enrich the detail of the data (Clifford, French, and Valentine 2010), but not to arbitrarily limit the research as most of the key drivers ranged across political and geographical borders. Rather, the intent was to enrich a regional backdrop for the employment of the study's research tools; a survey of experts (Chapter 5), workshop and scenario development (Chapter 6 and 7). Though data collection was as detailed as could be plausibly incorporated into analysis, early in the effort a judgment was made to approach the research questions with a top-down approach. A mechanical bottom-up manipulation of the data driven by an incremental economics model, or assessing and quantifying, even with the most rudimentary simplistic method just the economic variables, such as future rents and revenues, cash flows, hydrocarbon market pricing and the influences of supply and demand, just could not be proven with scientific method. A judgment was also made that it would also not be achievable to develop realistic *probabilities* (Scott 2014). The applicability of *qualitative* scenario methods for this dissertation's research objectives is supported by Swart, Raskin and Robinson: "The distinction between *quantitative* (modeling) and *qualitative* (narrative) should be underscored …Quantitative modeling is...appropriate for simulating well-understood systems over sufficiently short times…as complexity increases and the time horizon of interest lengthens, the power of prediction diminishes (Swart, Raskin, and Robinson 2004, 140)."

4.2 Complexity

Key drivers or variables that impact hydrocarbon development; global and regional energy markets, climate change effects and technological advancement, interact in a complex framework with varying speeds, and in a non-linear manner. The same is true of the effectiveness and influence of strategic policy, regional governance and the other social-political variables, as well as those specific to the Kara Sea region. Analysis of how key drivers might interact within scenarios for hydrocarbon extraction still had to embrace the challenge of different time scales for the multiple drivers of the future. *Complex Adaptive System* theory was deemed useful as a means to ground this interplay, taking into special account the capacity for shared learning and change overtime; especially with social-political drivers (Levin et al. 2012, 12). Complex adaptive systems have strong roots in archeology where rules of the natural

sciences do not always bind research parameters as information is shared within the data set, and direct modifications must be accounted for (Barton 2013). Even the simplest human societies and their components are complex because of this relatively rapid adaptability and capacity to share and learn. Often policy recommendations derived from the very best research and analysis assume linear dynamics, marginal change, and do not account for adaptive system learning.

4.3 Scenarios method

4.3.1 Origin of the scenario method

Scenario method has strong roots in strategic planning, and the O&G industry specifically. Early pioneers in the 1950s and 1960s at Royal Dutch Shell, including Jimmy Davidson and Ted Newland (Amer, Daim, and Jetter 2013) contributed much to institutionalize rigor in a process that is distinctly different from economic forecasting or military style deliberate planning. The fundamental approach of the "scenario" method is that there is no intent to predict or determine probability of future events. Rather, the objective is to identify the variables, usually termed drivers, and assess how they might interact within a complex system to produce plausible outcomes or narratives. Scenario futures are not attempts to forecast or predict linear projections into the future; rather they are created to best prepare future decisions makers for uncertainties. Scenarios narratives use storyboards, much like a novel or a screen play, but the intent is to construct plausible narrative futures to enrich future decision making, not simply entertain or build a timeline for the captivating or sensational. Rare events can and do have great impact, but by definition they are also improbable within the time frame of effective human decision. These rare but impactful possibilities termed "wildcards" or if especially cataclysmic, "black swan" events, are identified in the process, but kept aside and not incorporated into analysis. Highly improbable but cataclysmic astronomical events and strategic nuclear war, for example, would both usually fall in this category. A philosophical foundation for coping with these rare, but dramatic potentials on the future, as well as the impossibility of predicting them, is provided by Nassim Taleb

> *The Black Swan* is about consequential epistemic limitations, both psychological (hubris and biases) and philosophical (mathematical) limits to knowledge, both individual and collective. I say "consequential" because the focus is on impactful rare events, as our

> knowledge, both empirical and theoretical, breaks down with those---the more remote the events, the less we can forecast them, yet they are the most impactful (Taleb 2010, 330).

The "intuitive" approach to scenarios has also been used by Herman Kahn and the Rand Corporation as early as the 1960s. No mathematical algorithms are utilized and the focus is on identifying causal processes, decision points to improve decision making processes. Pierre Wack contributed to "adaptive" scenario planning, while at Royal Dutch Shell, by leading the process in 1972 that developed a set of plausible "stories" that envisioned an interruption in global oil supplies. This corporate scenario work gave Shell a leg up among their peers in reacting to the 1973 Arab oil embargo and related dramatic pressures on market supply (Amer, Daim and, Jetter 2013). If a forensic re-assessment proved available in the future to look back and score a scenario project, it would not be the eventual actual outcomes themselves of scenario narratives that validate their value, but how they assisted decision makers in best preparing for necessary decisions along the way. This approach has strong roots in industry, particularly oil and gas, but has also been applied in government. Most notably it was use as a tool for "transformative planning" in early post-apartheid South Africa in what are known as the Mont Fleur series of scenario exercises; but has also used by Singapore's Ministry of Defense and in the US, such as the Commission on National Security / 21st Century report in 2000 (Wilkinson and Kupers 2014).

Peter Schwartz, who also worked at Royal Dutch Shell, helped codify this approach in the pioneering *The Art of the Long View*. A scenario is defined as "…a tool for ordering one's perceptions about alternative future environments in which one's decisions might be played out (Schwartz 1991, 4)." Schwartz further refined this methodology at Global Business Network (GBN), a private consulting firm. The intent is to identify and differentiate between *key drivers* (causal variables) that can influence future change from the *predetermined elements* (variables that might also be causal) but can be assumed to hold relatively constant within the scenario timeline, as well as the unmasking of *critical uncertainties* (hypothesis development). If a key driver is best assumed to be relatively certain, or a pre-determined element, it has less inherent value in enriching decision as it is unlikely to be altered or influenced. To be valid, scenario narratives must be internally plausible, consistent and relevant. They should also be different

and broad enough in range to be of value for that purpose (Schwartz 2001). The GBN scenario methodology, which was utilized for the production of the Arctic Council's *Arctic Marine Shipping Assessment (AMSA)*, was the approach deemed most useful to manage the complexities of the different drivers for hydrocarbon development in the Kara Sea, as well as to explore their interconnectivity; and therefore was adopted for use in this dissertation.

4.3.2 Quantitative and mixed method scenarios

The scenario method described above and adopted for this dissertation is fundamentally qualitative and intuitive. There are other noteworthy schools of scenario development that are better suited for narrower research questions in shorter time frames. These include the "probabilistic modified trends" methodology, which uses the matrix based tools of "trend impact analysis" and "cross impact analysis." Another is the "prospective thinking," or French School model, initially presented by Gaston Berger that does not pre-suppose that the future is pre-determined by its drivers, but rather, can be modified and shaped. Quantitative methodologies are more generally applied to public or infrastructure development policies and planning, e.g. Carl Steinitz and his use of a wide range of sources and stakeholder perspectives to develop scenarios for use in landscape, and public resource planning (Steinitz et al. 2002). Mixed methodologies have also found a place in Royal Dutch Shell's own studies to enrich with statistical models the qualitative method they themselves pioneered to assesses topical futures as diverse as climate change, biodiversity, demography, migrations and transforming states (Shell 2005).

4.4 Other tools used: survey-interviews and workshops

4.4.1 Survey-interview

A survey-interview focused on delineating or "fleshing out" a likely set of key drivers identified in preliminary research was incorporated into the research design. The timing of the creation and execution of the survey-interview was January through September 2014, amidst much foreign policy turmoil over Russian foreign policy actions in the Crimea and Ukraine, and the resulting imposition of international punitive sanctions on the Russian Federation that targeted its Arctic offshore hydrocarbon enterprise. There was also a concurrent precipitous drop in the price of oil as depicted in Figure 4.2.

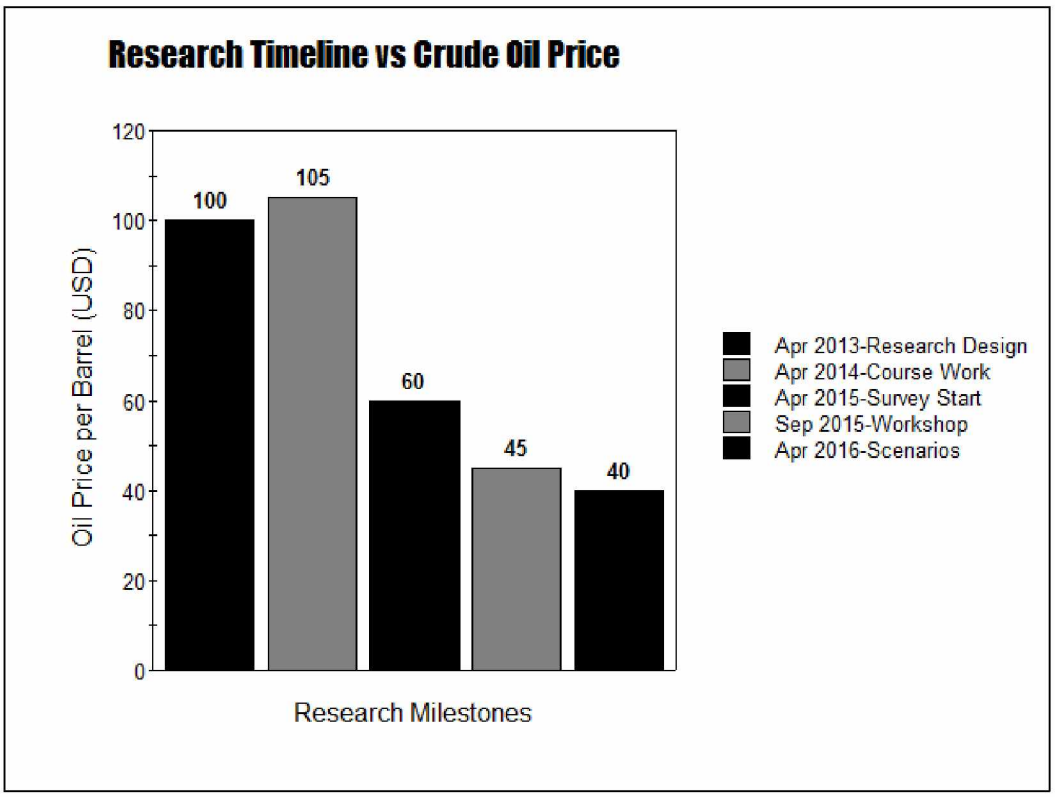


Figure 4.2 Research timeline compared to crude oil price

Source: Graphic created by researcher. Oil prices interpolated with rounded data (Ycharts 2016)

Due to the statistically small number of participating experts, the diversity of backgrounds and perspectives, as well as the social engineering tools used to form the sampling

pool, the study should be characterized as a series of targeted (not random) interviews; over the phone, in person, written and sent via email; hence the term *survey-interview* is used to differentiate from more suitably quantifiable models. The survey-interview was purposely a "survey" of experts in Arctic affairs and, especially to the extent possible, the *offshore* O&G industry. All responses were for non-attribution and data de-identified. A *snowballing* effect was desired to further identify experts in the relatively narrow niche of the Russian offshore hydrocarbon extraction expertise (Yin 2011). The construct of the survey-interview, in consideration of the senior level of many of the desired participants, was purposely kept brief and consisted of 15 multiple choice questions, on 14 pages, with the opportunity to add further detail to questions encouraged (Converse and Presser 1986). An open ended venting question (Rea and Parker 2005) was also incorporated into the design. Of the approximately 100 survey-interview forms distributed, 28 were completed and processed (Chapter 5).

Responses were tabulated and represented graphically, but scoring statistical techniques were not used due to the small size of the sample population as well as its non-random nature which hindered quantification. The survey-interview results were incorporated into assessing key drivers and were to some extent "validated / or not validated" within the dynamics of the scenario development process which followed. The project was submitted for ethical considerations to the University of Alaska Office of Research Integrity and was exempted from further review by the Institutional Review Board.

4.4.2 Workshop

As a means to augment dissertation research with additional expert input, and to add a measure of external validity to the identification of key drivers to Arctic offshore hydrocarbon development, a workshop was planned and also incorporated into the research design. The session was not of sufficient duration to achieve all the steps of a scenario development. However, the uniquely diverse group of 31 participants, from academia, the O&G industry, government and other Arctic stakeholders, was able to identify and rank 54 drivers to help frame further analysis. Its relatively large size makes it best to consider it a facilitated "working group" rather than a "focus group" (Stewart and Shamdasani 2015). Much useful work has emerged in the last 10 years by the inclusion of *decision theory* and creative metrics to tease out participant

group dynamics, such as institutional bias, where the "group" is the data source as much as the substance (White et al. 2010). However, due to time and resource constraints, but primarily the substantive objective, the workshop was straight forward, with professional opinion recorded and considered at face value.

Chapter 5 Expert survey-interview project

5.0 Overview

With the geopolitical influences from events in Crimea and the Ukraine as well as the slide in the price of oil in the background, an expert survey-interview project was designed and initiated in March 2015. The intent of the project was to add insight from experts into the key drivers for hydrocarbon extraction in the Kara Sea region. Also targeted were the drivers impacting the Russian Arctic offshore in general and any other global or regional factor that best characterize the strategic prospects of Russian success or failure in their strategic intent.

5.1 Survey-interview method and design

The research approach was a qualitative survey of experts in Arctic affairs and the offshore O&G industry. The construct of the survey-interviews, in consideration of the senior level of many of the desired participants, was purposely kept brief and consisted of 15 questions. A blank representation of the survey-interview format and questions used is included in Appendix A.

Eighty-five survey-interviews were sent by email. Another dozen paper copies were also distributed and attempts to coordinate contact with key individuals via the Linkedin social network. About one third of those targeted were individuals this researcher had met and obtained the contact's business card. The rest were contacts made and business cards obtained over the previous year, specific to the O&G industry or Arctic experts with a focus on offshore development in Russia. About half of the 28 participants were from the O&G industry, including three of the major IOCs. Experts from academia and within government as well as journalists also contributed by completing the survey-interview and providing data. Participation was very much from around the world to include the US, Canada, Russia, the Nordic countries, Central Europe and Asia. All respondents were provided a copy of the draft results.

Overall the questions themselves seemed understandable to participants and triggered the desired information in the responses. Due to the non-random, and at times specifically selected nature of the target population, as well as its small numbers, detailed statistical analysis was

determined to be not viable and potentially misleading. The survey's reliability rests on its capacity to enable qualified participants to accurately provide their insights and expertise to a significant aspect of the O&G industry; with global strategic implications. The answers provide a refinement of the *key drivers* for hydrocarbon development in the Russia's Kara Sea. Simple scoring to the questions were tabulated as well as substantive findings, summarized in the following results section, which can serve as points of departure for further discussion (Litwin 2003, 45-50). Note: The survey-interview project went through review for ethical considerations by the University of Alaska Office of Research Integrity and was exempted by the Institutional Review Board; it is also included in Appendix A.

5.2 Survey-interview results

5.2.1 Self-characterization by participants

The first four of the 15 survey-interview questions were designed to characterize the participants. Much of the detailed information on working with the Russians resides in the oil industry which has had an enduring relationship with Russian partners for over a century. Therefore, much effort was placed on gaining input from within that industry. Experience fell in two general categories; O&G industry (to include major IOCs, service support and regulation) and academic-research expertise (though there is much overlap of individual experience in those categories, e.g. an academic consulting for industry). Results were roughly split with 12 participants primarily associated with industry (to include government positions engaged in regulating or monitoring the industry) and 16 with academia (of those predominantly within social sciences, but also petroleum engineering, oceanography, economics and geoscience). The majority of participants were in senior positions, whether in academia, industry or government with expertise in the offshore Arctic and / or the Russia O&G enterprise. The questions and tabulated results for questions 1-4 are included in Figure 5.1 below.

1. Would you characterize your expertise and insight into hydrocarbon exploration and production in Arctic offshore regions as:

11 **A Extensive and specific to the offshore oil and gas industry in the Arctic**
7 **B Within broad professional scope but not necessarily Arctic focused**
7 **C Solid grounding in Arctic issues but not necessarily specific to hydrocarbon extraction**
4 **D Other and/or further comment:**

Researcher comment: Generally solid, and/or rare hands on expertise by a majority (one respondent provided two positive responses).

2. Would you characterize your experience in working with Russian firms in the oil and gas industry or regulatory authorities as:

6 **A Extensive**
6 **B Somewhat tertiary**
12 **C Little experience**
4 **D Other and/or further comment:**

Researcher comment: Boring down, about half the respondents have at least some experience engaging Russian oil industry firms and regulators, but half do not.

3. Would you characterize your expertise and insight into hydrocarbon extraction efforts in the Kara Sea as:

2 **A Specific and extensive for that region**
16 **B Well informed, but not in high detail for that specific region**
10 **C Other and/or further comment:**

Researcher comment: Most consider they are well informed on the relevant issues but not to a high degree of detail and specificity when further discriminating to a Kara Sea focus.

4. Do you have previous experience in partnering or otherwise had a working relationship with Russian oil and gas corporations or supporting service companies in Arctic offshore areas?

3 **A Yes, significant engagement**
9 **B Yes, but tertiary or to a minor extent**
11 **C No**
5 **D Other and/or further comment**

Researcher comment: Three self-identify with significant experience in this subset, with a majority indicating at least some experience.

Figure 5.1 Tabulated results for self-characterization questions

5.2.1.1 Highlights of self-identified expertise

These highlights are abridged, edited and arranged to give a sense of participant expertise.

Hydrocarbon exploration and production in the Arctic offshore

- Offshore O&G work in Alaska's Beaufort Sea and Greenland
- Shipboard service in the Beaufort Sea and off Newfoundland, Labrador, Baffin Island, Baffin Bay and Northwest Greenland
- Embarked research on Russian icebreakers in Arctic waters
- Oversight of research on Arctic energy
- Geology and geophysics of O&G offshore exploration and production
- Interaction between O&G companies and indigenous Russian people
- Expertise on the ice and ocean conditions of the Kara Sea and the neighboring Pechora Sea and the Gulf of Ob
- Work in the Russian Arctic shelf
- Subsurface mapping of hydrocarbon systems
- Environmental, socio-economic, traditional knowledge and ice issues

Engagement with Russian/FSU O&G industry

- Employment with TNK/BP (until 2008)
- Employment with TNK/BP (until 2008)
- Research on Russian oil and gas firms
- Support for oil projects on Sakhalin, ENI and consulting with US companies on operations in the Russian Arctic
- Work with Russian engineering colleagues engaged on Russian projects
- Work with Russians regulatory agencies and the Northern Sea Route (NSR)
- Engagement with Russian companies and regulators as an NGO activist
- Familiarity with Russian with Rosneft's offshore projects
- Interviews with Russian hydrocarbon companies
- Experience with Sakhalin and Kara Sea operations
- Work with US companies to set up Joint Ventures (JV) in Russia
- Work with Gazprom Naft and discussions with Rosneft
- Work with a team supporting Western O&G companies in the Kara Sea
- Work with maritime icebreaking operators supporting Russian O&G industry
- Work with Surgutneftegas input to support contributions to aboriginal / indigenous peoples' budgets

Arctic affairs expertise

- Arctic legal studies researcher
- Northern Sea Route researcher
- Participant in Arctic Council forums

Figure 5.2 Offshore, Russian industry and other Arctic experience

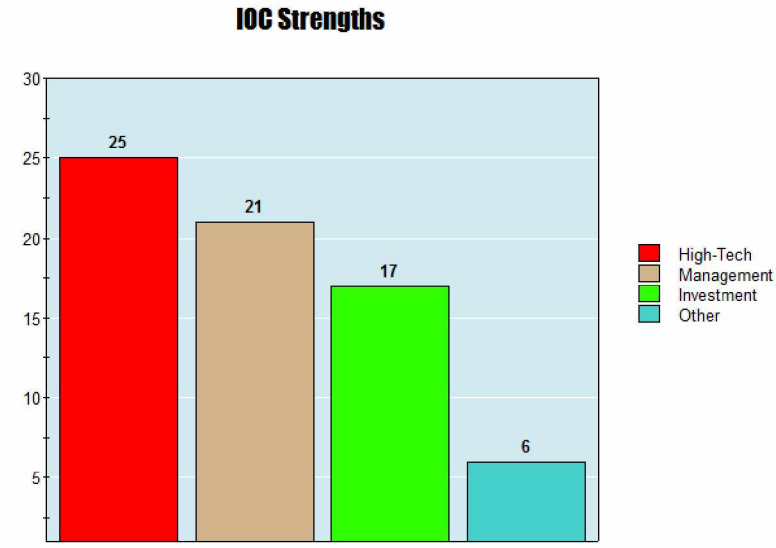
5.2.2 Substantive questions

The substantive questions were designed to gain insight from what the participant experts considered to be the key drivers impacting Russian success in the Arctic offshore. Explored were the capacity of Russia to incorporate the most advanced industry expertise and the specifics of the necessary technology. Also targeted were the character of the business details in partnering with Russian firms for these projects and the impact of international sanctions on Russian Arctic offshore hydrocarbon objectives. In a macro sense, what can influence Russian offshore developments and adherence to standards outside direct JVs with the IOCs? Also of interest were views on the long-term impact of sanctions and to get a sense from this expert group of their own views of the *drivers* of hydrocarbon development in the Arctic offshore. Specifically, what degree is the current drop in the price of oil inhibiting strategic investment in Arctic offshore oil and gas exploration? What other source or change in market dynamics will reduce demand for the development of offshore Arctic hydrocarbons? More than one response was permitted for each substantive question (5-14) as was not answering a question. Question #15, the final question, was simply a catch all to allow for open venting and recommendations for research sources. The following results are not stand alone "facts" but data from uniquely knowledgeable respondents to help guide further research. The findings listed below for each substantive question are edited and not correlated to individuals. Neither are the comments prioritized or presented in hierarchical form.

5.2.2.1 Tabulated results and (substantive questions 5-15)

The substantive comments are edited, highlights for each question to ensure the raw results were de-identified as required by IRB exemption.

Question # 5. Among the International Oil Companies (IOCs), such as ExxonMobil, which strengths would you consider best complement Russian corporations such as Rosneft, in joint venture efforts in Arctic offshore regions?



25	High-Technology
21	Managerial expertise
17	Investment capital
6	Other and/or further comment:

Researchers comment: Of value to note that "capital" does not trump all in these results.

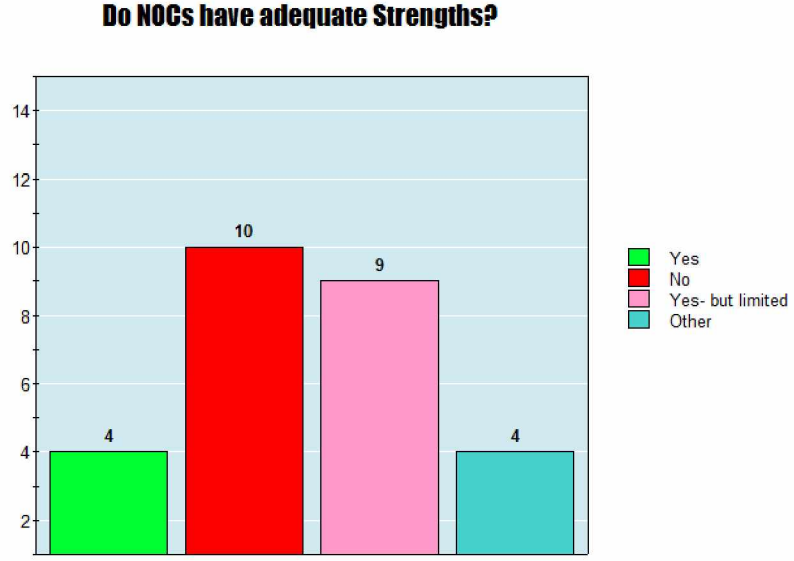
Figure 5.3 IOC strengths

Question #5 Substantive Comments:

- Technology and management expertise is the key. Capital can come from elsewhere, like India and China.
- ExxonMobil has strengths in all areas to include high tech, investment and offshore project management expertise which is of importance & direct relevance to Rosneft and other Russian oil and gas companies. Management of a large Arctic project requires unique expertise that ExxonMobil has (and Rosneft does not). Western technology & knowhow are essential to development of the Russian Arctic offshore.
- Technology management and capital are all important, but also important is the confidence to carry out exploration and development. Russia has everything it needs and/or could buy or borrow but lacks confidence. IOCs are less threatening to existing oligarchy within Russia who tend to believe they can control IOCs; whereas they cannot control upstarts like Yukos (Khodorkovsky's).

- IOCs add expertise in risk management to include environmental protection. Especially significant are the capacity to contribute to wildlife monitoring and marine mammal safety before, during and after operations.
- The overriding key strength that select IOCs bring to a joint venture is a safety culture mindset.

Question #6. Among the National Oil Companies (NOCs), such as only one example, Petroleos, do you see adequate strengths, which could replicate IOC participation and assistance to Russian hydrocarbon objectives in the Arctic offshore regions?



4	A	Yes
10	B	No
9	C	Yes, but to a limited extent
4	D	Other and/or further comment:

Researchers comment: Unclear if ExxonMobil can be replicated in the Kara Sea, but perhaps telling that no named alternative is offered that is not also following a sanctions regime such as Norway's Statoil. Only three participants have a strong position that IOC contribution could be replicated.

Figure 5.4 Do NOCs have adequate strengths?

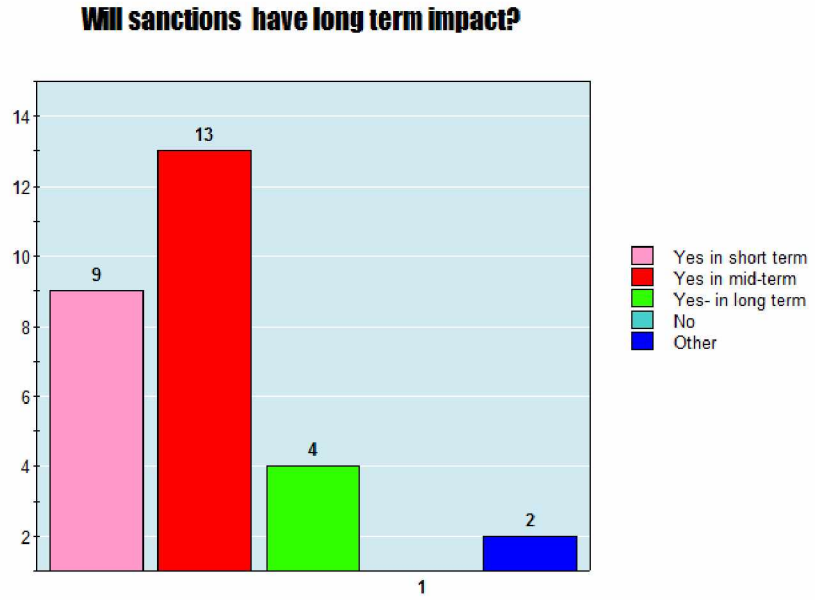
Question #6 Substantive Comments:

- Of the NOCs, only Statoil could really help the Russians (and Norway's regulatory policy closely adheres to EU sanction criteria). Pemex, PDVSA and

Petrobas for example, do not have experience or expertise in Arctic operations. None of the NOCs, especially Venezuela's Petroleos, have the technical expertise and experience to operate in the Arctic. Some such as Brazil's Petrobras are embroiled in scandal and controversy; others such as Saudi Aramco and Sinopec do not have the relevant technology or Arctic expertise to assist the Russians without IOC expertise in the Arctic, the NOCs would not do well financially or technologically in the region, at least in the short and probably mid-term. The Chinese NOCs could reasonably replicate much in the long term (10-15 years) but could help in the short and mid-term with economic trade-offs and capital.

- Very few NOCs have the required Arctic expertise and technology portfolio for Arctic conditions. Statoil is in a position to explore safely, responsibly and manage joint ventures to a high standard.
- Among service O&G companies, Halliburton and Schmalberg could provide much of what is needed in Kara Sea development (but not on same scale as the major IOCs).
- Other NOCs have limited experience in Arctic specific operations. Overall there is little such experience in the world and a large percentage is with Western IOCs or Western consulting firms.
- Russia is committed to continue. At the highest levels, Russia will soldier on, with or without the US (and Western IOCs currently restricted by sanctions).

Question #7. Do you feel the impact of international sanctions on cooperation with Russian corporations in Arctic offshore hydrocarbon projects will have a continued significant impact on suspended, curtailed or new cooperation even if they were lifted?



9	A	Yes, in the short term (two years)
13	B	Yes in the mid-term (two to five years)
4	C	Yes, likely to have an impact for a decade or more
1	D	No
2	E	Other and/or further comment:

Researchers comment: A Majority believe that there will be a lingering "sanction effect" but disagreement on how long.

Figure 5.5 Long-term impact of sanctions

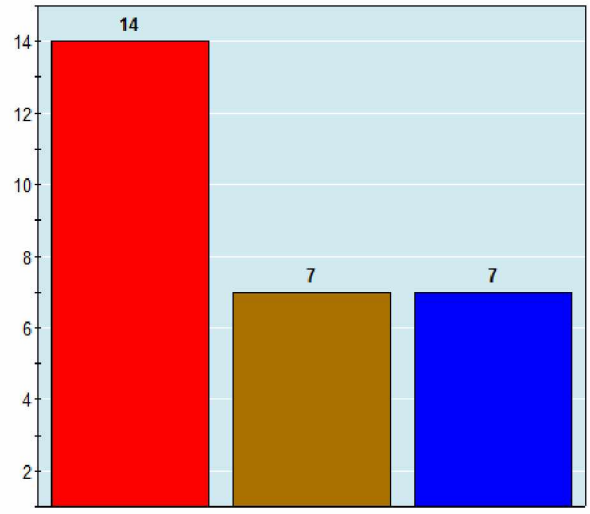
Question #7 Substantive Comments:

- Corporations big enough and competent enough to work offshore in the Arctic will not prematurely risk renewed sanctions until they are sure they will not return. And it will take time to reschedule shipping and service contracts. Should sanctions remain in place over an extended period of time, there may be long-term effects from new companies, such as from Asia, coming to the Arctic and replacing Western ones. If they do, these new players will not go away just because sanctions are lifted. Markets will be restructured.
- The larger companies, like ExxonMobil, will get back in the saddle very quickly in an attempt to recover some of their losses inflicted as a result of the sanctions. Smaller companies have always been reluctant to enter the Russian market. That market is for the large IOCs that can offset the risks of operating in Russia. The

select few Western IOCs that had joint ventures with Rosneft or Gazprom before the sanctions should be able to re-establish a similar degree of cooperation.

- The longer the sanctions are in place the longer the delay of application of the key technology and Arctic expertise needed to fully develop the Kara Sea offshore fields.
- The Russians cannot develop these fields without foreign investment and technology. That investment will remain to some degree dependent upon political stability and credible guarantees of long-term contract enforcement.
- Both Rosneft and ExxonMobil want to continue. However, Russian leadership has stated publically that it is not certain it can any longer trust the US in terms of continuity and stability in commercial sense. There may be a continued geopolitical impact on business contracts.
- Russia looks at economics differently from the west. They have a history, going back to the Soviet era, of massive investment on questionable economic viability, if for a greater strategic policy objective, and perhaps economically sound in the long term as well (the development of Western Siberia in the 1960s for example). Development of its offshore hydrocarbon reserves is at the center of the Russian Federation's Arctic strategy and effort will continue without Western engagement, though not as rapidly.
- Sanctions need to be put in a larger context. Russian anger with the West may persist for years, but the Russians will likely be happy to welcome back IOCs. Money will help make animosity disappear. It is largely dependent on how long. If only another year or so of sanctions, things will likely bounce back pretty rapidly. However, if longer than more difficult. So it is a function of time.

Question #8. Do you feel hydrocarbon extraction governance structures and compliance with international safety and environmental standards in Russian Arctic offshore regions will be impacted by a curtailment/reduction in engagement with IOC partners?



14 A Yes, significantly
7 B No, not significantly
7 C Other and/or further comment:

Researchers comment: The majority, but not all, see a negative effect for the environment.

Figure 5.6 IOC impact on HSE standards

Question #8 Substantive Comments:

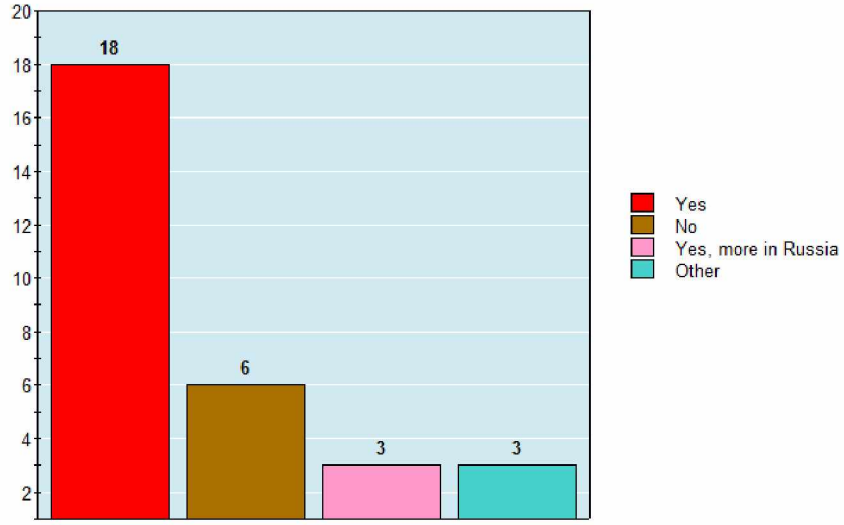
- Environmental and safety standards have probably improved since Western IOCs began working in Russia (Sakhalin, Pechora and Kara Sea). Standards could lapse significantly during the period of sanctions.
- Russian Health Safety and Environment (HSE) standards are generally perceived as lax and poorly enforced. Corruption and bribery were seen as common despite regulations that looked good on paper. Flaring incidence was noted as very high though illegal in Russian regulation. In contrast, Western companies, especially the larger IOCs, operate HSE in Russia in common with international global practice.
- Compliance in Russia must be tied to enforceable and meaningful penalties. If it's less painful to do it right than it is to pay the penalty and cut corners, exploration and production in Russia's offshore region will be done within international best practice standards. This will be a challenging goal. Sound,

formal international standards should be adopted worldwide, including Russia, to ensure the best HSE standards are applied to ensure risk mitigation.

- Some reduction in standards may apply. However, it would be surprising if Russian Gazprom Neft or Rosneft would be able to operate in these areas without any participation of the IOCs. If they would be, Russian laws would apply to the projects, meaning a deviation from international standards in the areas of insurance policies (value taken out of project budgets such as occurred at Gazprom's Prirazlomnoye drill site in the Pechora Sea), which possibly might lower the adherence to HSE standards.
- IOCs contribute expertise in environmental protection, ice management in addition to risk and project management, and oil spill prevention. Examples include; ice-monitoring and management, safe drilling and reservoir management expertise (subsurface geo-pressure management); environmental impact assessments, risk assessments and mitigation measures.
- There will likely be a moderate impact on HSE standards compliance if IOC partners remain outside and/or are curtailed. The IOCs certainly bring the latest Western HSE standards and knowledge of sustainability to the Russian Arctic. However, Russian companies must meet many of the same international standards with or without IOC involvement. There is a key question of enforcement by the Russian government authorities who may be more proactive when there is IOC presence within an Arctic offshore project. There would be some pressure to bear within the Arctic Council (which is solely focused on cooperation in sustainable development & environmental protection) if Russia took a 'go it alone' approach to offshore safety/environmental protection issues.
- Most large international companies working in this difficult part of the world realize that any break of governance compliance will have a negative collective effect on all players in the region.
- It may also depend, especially with continued sanctions, on the safety technology of Asian companies that may serve as replacements for Western IOCs on projects. Safety culture in Russia is weak, but it may be improved under international pressure in the Arctic.

- It depends on who the new joint venture partners are. Not all large IOCs have the highest safety and environmental standards built into their operations.
- IOCs can help in harmonizing standards and reducing geopolitical tensions.
- Partnerships and relationships with international reputable organizations are also an important consideration factor (note: point being that it is not solely IOCs who can influence the nature of standard working practices).

Question #9. Is the current drop in the price of oil inhibiting strategic (long-term) investment in Arctic offshore oil and gas exploration?



18	A	Yes
6	B	No
3	C	Yes, and to a greater degree in Russia than other Arctic offshore regions
3	D	Other and/or further comment:

Researcher comment: Though a large majority say yes, and the wording of the question is clear, comment responses seem to indicate a short-term focus.

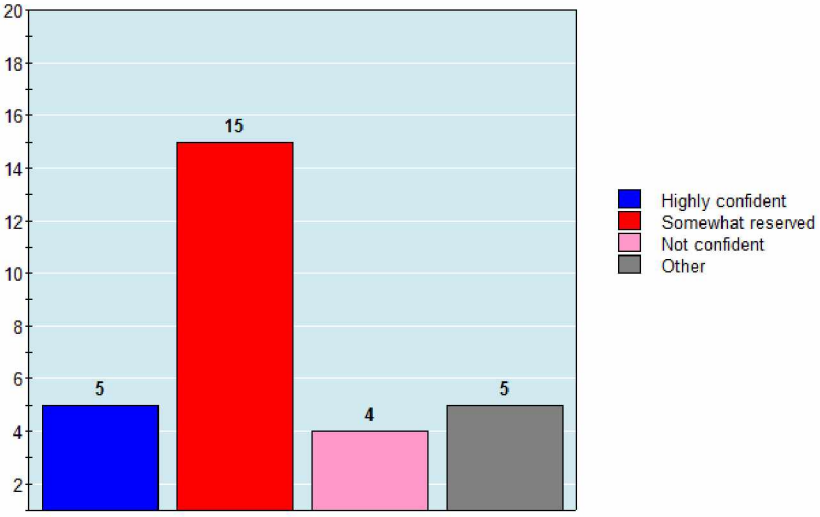
Figure 5.7 Is the low price of oil inhibiting investment?

Question #9 Substantive Comments:

- In the short term, and possibly mid-term, low oil prices are inhibiting development in terms of cash flow and capital budgeting, Arctic oil, and especially gas, presently are off the table. But there is an understanding that the multinationals need large reserve of traditional crude oil that are available nowhere else in the world. The competition for oil reserves will continue, regardless of price, as long as oil is the primary power source. Nonetheless, the low oil price will delay activities in the Russian Arctic because of tight cash flow.
- However, IOCs with strong balance sheets will continue to explore in the Arctic because the Arctic may be the only area that is able to give them a large reserve find. Exploration of energy reserves in the Arctic is a very long-term endeavor and not likely to change exploration long term. For example, ExxonMobil is more of a long strategic thinker among oil companies because of its size and looks to replace reserves in a 10-15 year cycle. If development starts now, the long lead times necessary to bring on new crude oil production from the Russian Arctic would coincide with a long term expected decline of world production. This varies though among O&G IOCs dependent on their need for revenue. Some IOCs are slashing budgets for the Arctic.
- The impact is dependent as well on how long oil prices stay low. It is a safe bet investment will continue, but at a slower rate, if prices remain depressed for a long time.
- In general, another distinction may be that current oil prices have had more of an impact on IOCs, as they are driven by economics, than Russian NOCs, which have more of a national strategic perspective. Low oil prices impact investment in Russia by Russians less than in other countries.
- From the sovereign state perspective Russia and Norway also have long-term strategies for developing Arctic offshore oil and gas. Arctic frontier exploration today will likely yield economic production some two decades out, so this exploration/investment is strategic in practice.

- Fracking, particularly in the US will have short-term (10-15 years) implications for Arctic hydrocarbon development. But large Arctic finds (especially for oil) will still be significant contributors to the global hydrocarbon economy.

Question #10. If legal restrictions on working with Russian oil and gas enterprises were lifted, how confident are you with partnering with Russian joint ventures compared to other potentials on the globe?



5	A	Highly confident and comfortable (limited-to research in one case)
15	B	Somewhat reserved
4	C	Not confident
5	D	Other and/or further comment:

Researcher note: Measured after effect of sanctions seen by significant majority.

Figure 5.8 Confidence in engaging in Russia

Question #10 Substantive Comments:

- High risk high reward, not unlike many countries. The question of whether more so in Russia than elsewhere depends on whether the 'elsewhere' is, for example, North America or Greenland?
- BP made a lot of money in Russia, but it was very difficult, and the legal system was corrupt. Russian laws can change without much notice. But there is big

money to be made. Lots of risks, but potentially big rewards. The biggest detractors are that the economics of a project are not robust enough and lack of a firm and transparent legal framework.

- Russia has a history of realigning or turning over companies. An example is with Shell in the Sakhalin-2 project. Under the best conditions, Russian companies are difficult to trust.
- Large companies with a lot of clout should have no problem. Smaller companies (sub-contractors) may be more easily treated poorly from a regulatory and immigration point of view. Joint Ventures between the major Russian oil and gas companies can be re-established with the Western IOC with whom they partnered before the sanctions and will likely be evaluated on a case-by-case basis.
- There are always many questions regarding the Russian banking and court systems….and the many roles of the Russian government in such joint ventures. No JV can feel comfortable working with the Putin regime in power. However, the importance of Russian Arctic oil and gas to Russia's economy (GNP/GDP) means that many partnerships can be robust. The vastness and great potential of Russian Arctic offshore oil and gas cannot be overlooked by Western companies, so JVs will proceed again, if cautiously, in the most promising regions.
- The IOCs tend to use internal expertise where possible and then contract to Russian companies for local requirements.

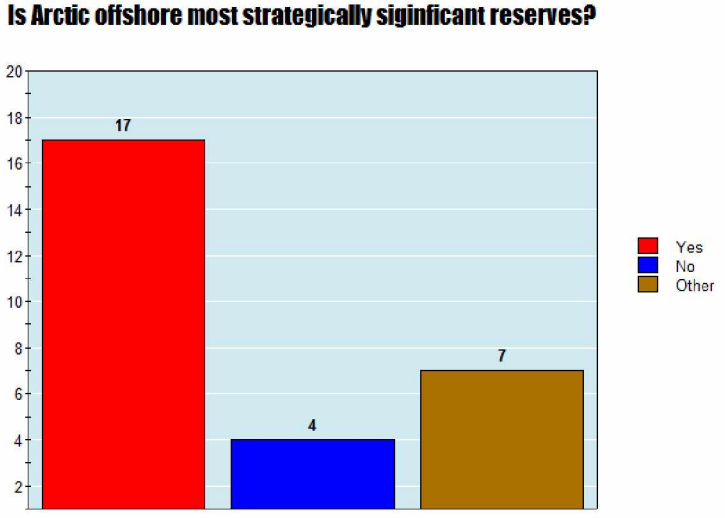
Question #11. How much influence has your answer to question (10.) been impacted by the series of sanctions targeting Russia begun in 2014?

6	A	Significantly influence
15	B	Not been a significant influence
7	C	Other and/or further comment:

Researchers comment: The substantive comments for this question were incorporated within other responses elsewhere; neither were the results graphed as it became clear, on late review, that question #11 did not have standalone significance.

Figure 5.9 Influenced by sanctions

Question #12. Do you believe the offshore Arctic hydrocarbon regions are the most quantifiably significant undiscovered and economically recoverable energy reserves within the next 30 years?



17 A Yes
4 B No
7 C Other and/or further comment:
Researcher comment: Clear majority see strategic value of Arctic hydrocarbons in global context.

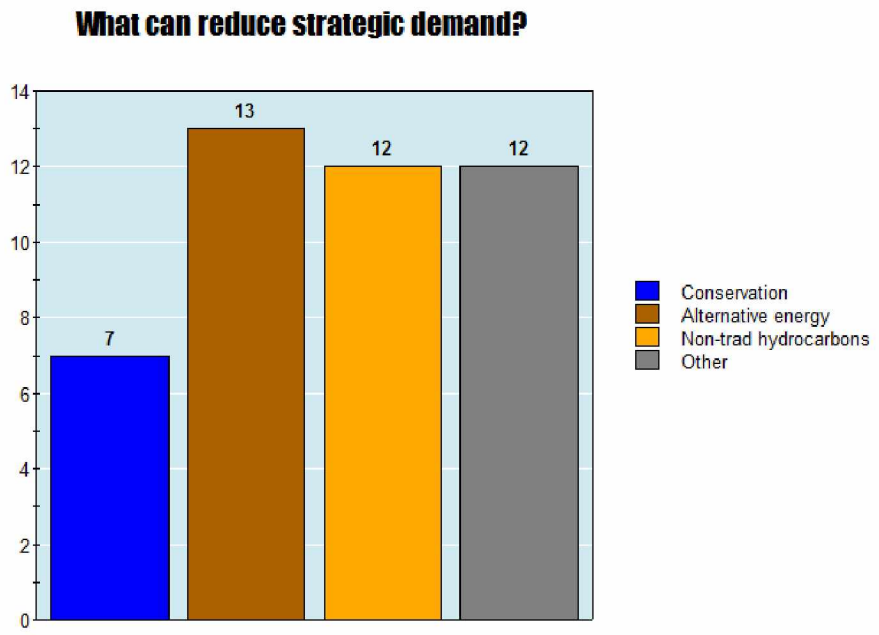
Figure 5.10 Is the Arctic offshore the most strategic reserve?

Question #12 Substantive comments:

- Offshore Arctic and very deep water (like 10,000 feet) are significant and will likely undergo continued development during the next 30 years; both are also very difficult and expensive. But the *onshore* reserves in the Arctic regions are also significant and likely *more recoverable in terms of cost*, environmental impact and mature technology than offshore options.
- People, companies, even major IOCs can be intoxicated by the size of the prize before the economics are there. Sakhalin and Hibernia both took about 22 years to reach production in "normal" times (no sanctions). There needs to be high resource density, especially offshore because of the much greater cost of offshore drilling in Arctic conditions.

- The Kara Sea, like much of offshore Arctic can appear lucrative in presentation graphs and bar charts, but the economics are not always there for production. A major impact on profitability often undervalued in analysis is the significance of the *density* of an oil field. Particularly for the difficult Arctic offshore region, broad expanses of even very large fields that are thinly spread require many hugely expensive wells. This geological but also "economic" factor has been under-valued. Nowadays, simply "booking reserves" for stock value purposes is a bit obsolete, it is also about whether the reserves are economical to produce.
- The Kara Sea is a bit like the Chukchi Sea in the sense that Shell (off Alaska) in 2015 was hitting (exploring-drilling) a wide but thinly spread field. The most expensive component in the production chain is the "wells." It will take many in such areas. Deposit may be too thin to be economical. In the Arctic offshore wells cost 8 times more offshore than onshore. Chukchi and Kara Sea wells would be about $400 mil each (by comparison a well at Prudhoe would be $60 million).
- While the Arctic region holds the most hydrocarbon potential, the Arctic does not necessarily have the greatest *energy* reserves. There is the potential in solar energy in tropic and temperature regions as solar cells become more competitive. It is unknown how rapidly alternative energy will develop, but it may well compete and delay very expensive Arctic projects.
- Another unknown is where fracking will be 10 years from now. There could also be Russian shale oil or African shale oil projects coming on line with the technology recently developed in North America.
- The Arctic offshore region is undoubtedly a significant frontier for oil and gas exploration and development. However, most of the Arctic offshore is a *gas* province with only several key pockets of offshore oil likely; off Alaska and the Russian Arctic.

Question #13. What other source or change in market dynamics will reduce demand for the development of offshore Arctic hydrocarbons?



5	A	Dramatic reduction in overall energy demand through conservation efforts or otherwise
13	B	Rapid rise in the macro-economic viability of alternative energy sources (other than hydrocarbons)
12	C	Significant change in the macro-economic viability of non-traditional hydrocarbon supply
12	D	Other and/or further comment:

Researcher comment: Few of the experts believe global supply/demand can be altered dramatically by political decision. Greater weighting was given to alternative energy (both hydrocarbon and non-hydrocarbon) than the possibility of dramatically changing overall global demand.

Figure 5.11 What can reduce strategic demand?

Question #13 Substantive comments:

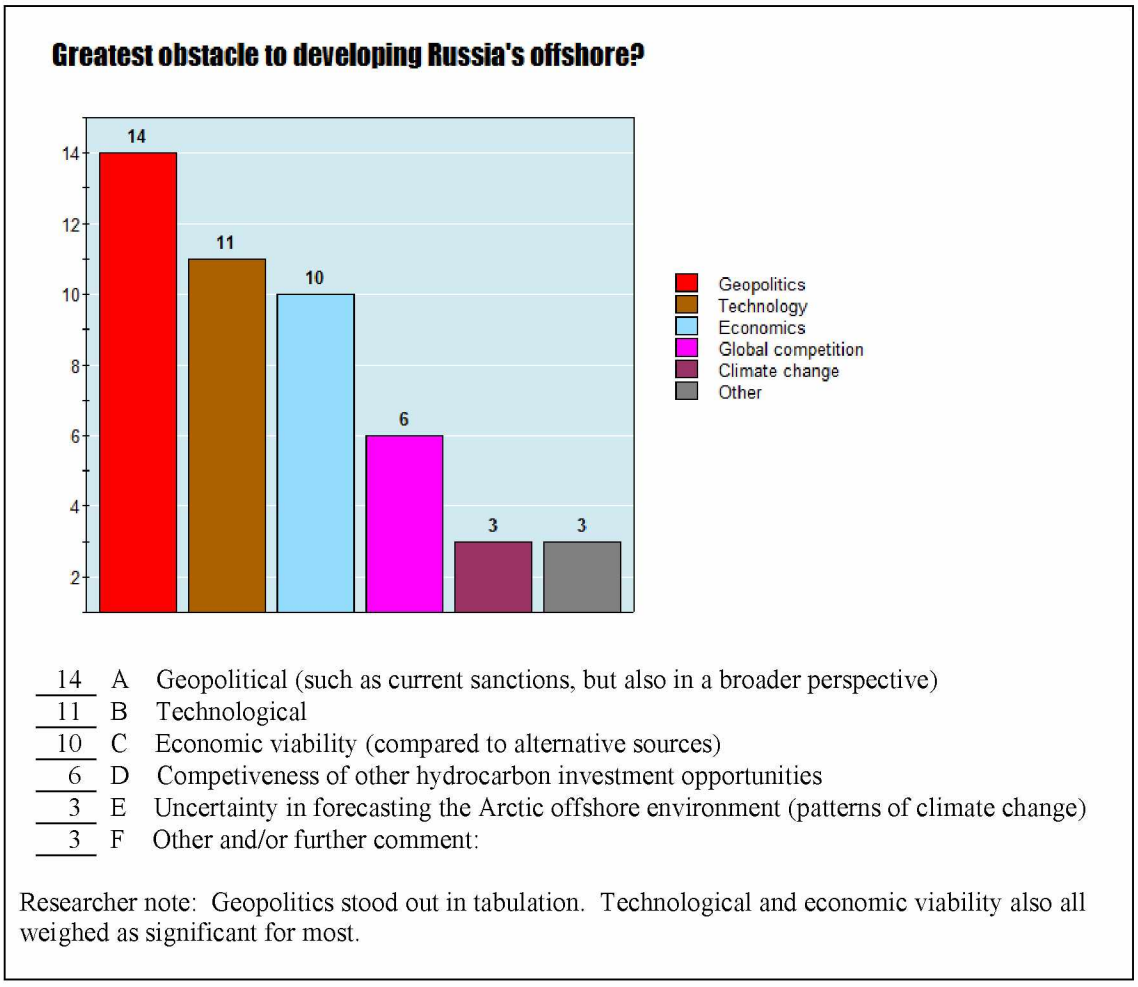
- Conservation can help, and already has helped. A contributing factor for conservation is the increased awareness and international collaboration on preserving Arctic ecosystems, and the potential international agreement to limit oil and gas extraction on that basis. Some alternative energy, like wind, are "real technologies" (not fantasies) and can reduce demand for gas. But liquid hydrocarbons will run the planet for a long time. As long as hydrocarbons are the cheapest alternative for fuels the majority of the developing world will use them. The International Energy Agency (IEA) projects that oil and gas will constitute 74% of the global energy mix in 2040. This takes into account conservation efforts and the continued growth of renewable energy technologies. Furthermore,

the IEA states that by 2040, the renewable energy sources will constitute 5% of the global energy mix (http://www.worldenergyoutlook.org/).

- A downturn or lack of growth in world economy due to shortage of other raw materials could force hydrocarbon conservation.
- Market economics will trump political decisions which have proven expensive and unreliable. *War* is a game changer---otherwise they will be developed. Conservation cannot keep pace with economic growth.
- As long as market dynamics keep the oil price low, below break- even prices, development projects in the Arctic will be limited. In the short term, current pricing/oversupply by OPEC and others will challenge Arctic development. Additionally, non-traditional hydrocarbon supplies from hydraulic fracking, particularly in the US, will have key, near-term negative implications for Arctic frontier offshore exploration and development. However, in the longer-term the potential of the Arctic offshore, especially for *oil*, is very high and exploration will intensify. It remains much more unclear how Arctic gas will be explored and developed due to the regional nature and volatility of global gas prices. There are serious competitors to Arctic gas such as the Australia offshore (principally in Western Australia) which has a close major market in China. But oil is king in the Arctic offshore and if found is a much more valuable commodity on world markets with a much greater likelihood of being produced.
- The O&G industry and the international community need to be ready for big changes at a moment's notice for something like the sudden explosion of the fracking revolution. There will be some alternative energy sources that may spread wildly that will significantly reduce the need for the amount of hydrocarbons we use today, even in the third world.
- There is a trend in O&G companies to disinvest from hydrocarbon alternatives.
- The immense magnitude of global energy needs is often difficult to comprehend. Every day consumers around the world use more than 92 million barrels of oil and liquid. A helpful perspective is the example from the Hebron development offshore eastern Canada. Hebron is among the largest engineering projects underway anywhere in the world and after five years of construction at a cost of

$14 billion is scheduled to start up in 2017. The immense facility is expected to produce oil for three decades. This energy project is expected to produce about 700 million barrels of oil over the course of 30 years. That *total* amount of oil Hebron will supply is equivalent to about *eight days of current global oil requirements*.

Question #14. Do you feel the greatest obstacle to developing Russia's offshore hydrocarbons is?



14	A	Geopolitical (such as current sanctions, but also in a broader perspective)
11	B	Technological
10	C	Economic viability (compared to alternative sources)
6	D	Competiveness of other hydrocarbon investment opportunities
3	E	Uncertainty in forecasting the Arctic offshore environment (patterns of climate change)
3	F	Other and/or further comment:

Researcher note: Geopolitics stood out in tabulation. Technological and economic viability also all weighed as significant for most.

Figure 5.12 What is the greatest obstacle to developing the Russian offshore?

Question #14 Substantive Comments:

- The technology needed exists or can and will be developed. In the long term the Russians will be not be deterred by international opinion or Western influence. Climate change may potentially make it easier with increased open water seasons and access.
- The economics are the biggest challenge and current sanctions have made it even more difficult. But if they can come up with sound economics---it will be done. Sustained high oil prices will be required, which is an unknown, and the biggest risk.
- Trust in the reliability and stability of partners and the ruling political regime is lacking. Your partner could currently be in favor with the government, but then, unpredictably, have licenses blocked once it has fallen out of favor. Even in the best of times Russian laws and regulations governing the O&G industry are complex, often unclear and open to uncertain interpretation and implementation.
- A stable long-term arrangement in terms of governance, royalties, etc. is essential to permit long-term strategic partnerships needed for Joint Ventures; oil prices need to be sufficient to attract private sector investments, but even if prices are relatively low, it may be possible to develop *if the fields are large enough*. Fracking has made tight oil a strong competitor; shale gas made Schtockman project non-viable by depressing NG prices. Very low oil prices could have a similar effect. Presently shale oil costs are high but new technology to reduce shale oil costs could have a significant effect.
- It is all about economics of global commodity prices and the competition of other oil and gas investment opportunities. There is fair certainty that the Russian Arctic offshore contains a bonanza of oil and gas and is potentially one the last and great frontier hydrocarbon regions on the planet. The geopolitical and technological challenges can be overcome and will *not* dominate (drive) the plausible futures/scenarios. The changes in Arctic sea ice and other environmental factors (due to anthropogenic global warming) will provide greater marine access and potentially longer seasons of exploration but these changes are *no*t the primary drivers of investment and development.

- The economic viability of Arctic development is challenged by operating conditions and the need for updated regulations that reflect arctic conditions. The arctic environment poses some different challenges relative to other oil and gas production areas, but is generally well understood, especially in the shelf areas with current interest. The O&G industry has a long history of over ninety years of successful operations in arctic conditions enabled by continuing technology and operational advances.

Question #15. Please feel free to provide any additional insight that you feel might contribute to this study and/or suggested resources (e.g. studies, analysis, documents released to the public).

Comments:

- Developments along the Northern Sea Route (NSR) will also provide infrastructure and vessels (e.g. icebreaker, support vessels, etc.). These strategic investments will also support potential developments of offshore oil and gas.
- There was no mention of indigenous peoples, who are affected by offshore developments when onshore facilities and pipelines are constructed, as well as when operations, transportation and pollution affect fisheries. Campaigns relating to Indigenous Peoples' rights can affect a company's ability to operate, aside from the fact that companies should respect and be aware of the indigenous and local populations living in an area of operations.
- The Circum-Arctic Resource Assessment (CARA) effort needs to be redone with better data to reduce uncertainty. The error biases are huge.

5.3 Consolidated observations - key findings

(1) IOCs provide critical technology, investment and management. ExxonMobil specifically can provide unique capacity in very large and complex offshore projects undertaken in Arctic conditions.

(2) IOCs also bring expertise to Russian projects in risk management a safety mindset. Examples include; ice-monitoring and management, safe drilling and reservoir management expertise (subsurface geo-pressure management); environmental impact

assessments, risk assessments and mitigation measures. Also significant are the capacity to contribute to wildlife monitoring and marine mammal safety.

(3) The larger companies, like ExxonMobil, will get back in the saddle very quickly in an attempt to recover some of their losses inflicted as a result of sanctions. Smaller companies have always been reluctant to enter the Russian market. That market is for the large IOCs that can offset the risks of operating in Russia. The select few Western IOCs that had JVs with Rosneft or Gazprom before the sanctions should be able to re-establish a similar degree of cooperation.

(4) Of the NOCs, only Statoil could really help the Russians in the short to mid-term (and Norway's regulatory policy closely adheres to EU sanction criteria). None of the other NOCs have the technical expertise and experience to operate in the Arctic on a large scale. But the Chinese and other NOCs may be able to replicate much in the long term.

(5) Russia is committed to continue. At the highest levels, Russia will soldier on, with or without the US (and Western IOCs currently restricted by sanctions). The effort will continue without Western engagement, though not as rapidly.

(6) Corporations big enough and competent enough to work offshore in the Arctic will not prematurely risk renewed sanctions until they are sure they will not be reinstated. Should sanctions remain in place over an extended period of time new companies, such as from Asia, could replace Western ones and restructure markets.

(7) Russia looks at economics different from the West. They have a history, going back to the Soviet era, of massive investment on questionable economic viability, if for a greater strategic objective (the development of Western Siberia in the 1960s for example).

(8) Russian HSE standards are generally perceived as lax and poorly enforced in this study. Corruption and bribery were seen as common despite regulations that looked good on paper.

(9) Environmental and safety standards have probably improved since Western IOCs began working in Russia (Sakhalin, Pechora and Kara Sea) and could lapse significantly during the period of sanctions. Compliance in Russia as elsewhere in the world must be tied to enforceable and meaningful penalties.

(10) Most IOCs working in this difficult part of the world (Arctic) realize that any break of governance compliance will have a negative effect on all players in the region. IOCs can be a factor in harmonizing standards and reducing geopolitical tensions.

(11) In the short term and possibly mid-term low oil prices are inhibiting development in terms of cash flow and capital budgeting. But the multinationals need large reserve adds that are available nowhere else in the world. The competition for oil reserves will continue, regardless of price, as long as oil is the primary power source. Nonetheless, the low oil price will delay activities in the Russian Arctic.

(12) IOCs with good balance sheets will continue to explore in the Arctic because the Arctic may be the only area that is able to give them a large reserve find. Exploration of energy reserves in the Arctic is a very long-term endeavor. For example, ExxonMobil is more of a long strategic thinker among oil companies because of its size and looks to replace reserves in a 10-15 year cycle. If development starts now, the long lead times necessary to bring on new crude oil production from the Russian Arctic would coincide with a long term expected decline of world production. But this perspective varies though among IOCs depending on their need for revenue.

(13) Another distinction may be that low oil prices may have more of an impact on IOCs as they are driven by economics more than Russian NOCs who have more of a national strategic perspective. Low oil prices impact investment in Russia by Russians less than in other countries.

(14) Fracking, particularly in the US will have short-term competitive implications for Arctic hydrocarbon development, but large Arctic finds (especially for oil) will still be viable to the global hydrocarbon economy. It is unknown where fracking will be 10 years from now. There could also be Russian shale oil or African shale oil projects coming on line with the technology recently developed in North America.

(15) The Russian Arctic offshore is high risk high reward, not unlike the O&G business in many countries. The question of whether more so in Russia than elsewhere depends on whether the 'elsewhere' is, for example, North America or Greenland? Investment will remain to some degree dependent upon global comparative political stability and credible guarantees of long-term contract enforcement.

(16) The offshore Arctic hydrocarbon reserves and very deep water (10,000 feet) are significant globally and will likely undergo continued development during the next 30 years; but both are also very difficult and expensive. The onshore reserves in the Arctic regions are also significant and may be more recoverable in terms of cost, environmental impact and mature technology than offshore options.

(17) People, companies, even major IOCs can be intoxicated by the size of the prize before the economics are there. Sakhalin and Hibernia both took about 22 years to reach production in "normal" times (no sanctions). There needs to be high resource density $offshore because of the much greater cost of offshore drilling in Arctic conditions.

(18) The Kara Sea is a bit like the Chukchi Sea in the sense that Shell (off Alaska) in (2015) was hitting (exploring-drilling) a wide but thinly spread field. The most expensive component in the production chain is the "wells." It will take many in such areas. Deposit may be too thin to be economical. In general, the Arctic offshore wells cost 8 times more offshore than onshore. Chukchi and Kara Sea wells would be about $400 mil each (by comparison a well at Prudhoe would be $60 million).

(19) While the Arctic region holds the most hydrocarbon potential, the Arctic does not necessarily have the greatest energy reserves. There is the potential in solar energy in tropic and temperature regions as solar cells become more competitive. It is unknown how rapidly alternative energy will develop, but it may well compete and delay very expensive Arctic projects.

(20) The Arctic offshore region is undoubtedly a significant frontier region for oil and gas exploration and development. However, most of the Arctic offshore is a gas province with only several key pockets of offshore oil likely in the Alaska and the Russian Arctic offshore regions.

(21) Conservation can help reduce demand for Arctic hydrocarbons. A contributing factor for conservation is the increased awareness and international collaboration on preserving Arctic ecosystems, and the potential international agreement to limit oil and gas extraction on that basis. Some alternative energy, like wind, are "real technologies" (not fantasies) and can reduce demand for gas. But liquid hydrocarbons will run the planet as long as hydrocarbons are the cheapest fuel alternative; especially true for the developing world. The International Energy Agency (IEA) projects that oil and gas will constitute 74% of the

global energy mix in 2040. This takes into account conservation efforts, and the continued growth of renewable energy technologies. Furthermore, the IEA states that by 2040, the renewable energy sources will constitute only 5% of the global energy mix.

(22) In the short term current pricing / oversupply by OPEC and others will challenge Arctic development. However, in the longer-term the potential of the Arctic offshore, especially for oil, is very high and exploration will likely intensify. The market viability of Arctic offshore gas development remains much more unclear.

(23) The immense magnitude of global energy needs is often difficult to comprehend. Every day consumers around the world use more than 92 million barrels of oil and liquid. For perspective the Hebron development offshore eastern Canada is among the largest engineering projects underway anywhere in the world. After five years of construction at a cost of $14 billion is scheduled to start up in 2017. The immense facility is expected to produce oil for three decades. The project is expected to produce about 700 million barrels of oil over the course of 30 years. That *total* production over a 30-year span will supply the equivalent of eight days of current global oil requirements.

(24) The Arctic environment poses some different challenges relative to other oil and gas production areas, but is generally well understood, especially in the shelf areas with current interest. The O&G industry has a long history of over ninety years of successful operations in arctic conditions.

(25) Infrastructure developments along the Northern Sea Route are strategic investments that will also support development of offshore oil and gas.

(26) Campaigns relating to Indigenous Peoples' rights can affect a company's ability to operate, aside from the fact that companies should respect and be aware of the indigenous and local populations living in an area of operations.

(27) The Circum-Arctic Resource Assessment (CARA) effort needs to be redone with better data to reduce uncertainty.

5.4 Conclusions from survey-interview

Russia has and can be expected to continue to attempt to mitigate the impact of sanctions by seeking capital investment and managerial offshore expertise elsewhere. If sanctions are lifted, indications are that Russia's Rosneft will rebuild efforts with its US Joint Venture partner

ExxonMobil. A necessary shift to other partners, such as from China or Venezuela, has been featured heavily in the press. This survey provides data that highlight the complexity and difficulty of a "shift of partners." Technology and management expertise is key. Expertise is not as liquid as capital, especially in the short term and mid-term. Though a clear majority of respondents believe the offshore Arctic hydrocarbon regions are the most quantifiably significant global undiscovered and economically recoverable energy reserves there is reason for caution (in an investment sense). It can perhaps be overly optimistic to focus on the magnitude of Arctic offshore reserves and underestimate the economic risk and complexity of forecasting market demand. The need for *high resource density,* especially offshore, is a factor often overlooked.

This survey of experts indicated that a majority believed hydrocarbon extraction governance structures and compliance with international safety and environmental standards in Russian Arctic offshore regions would be negatively impacted by a curtailment of engagement with IOC partners. Historically, distinctions that characterize the Russian hydrocarbon industry are a relative lack of the most-advanced offshore techniques (compared to the best of the IOCs) and in general a lack of adherence to a steady and consistent legal enforcement standards and this was reinforced by the study. It remains in a definitive sense unclear if ExxonMobil and other IOCs capacity to assist Rosneft and Russian State objectives in the Arctic offshore can be replicated, but perhaps telling that no named alternative was offered that is not also following a sanctions regime (Norway's Statoil). Only 4 of 28 participants had a strong position that IOC contribution could be replicated.

Among respondents, a very clear majority of the experts believe that the current drop in the price of oil is inhibiting current strategic investment in Arctic offshore oil and gas exploration; but as could be expected, less certain is the long term investment trend. Some IOCs are still investing long term, but others are slashing budgets for the Arctic. The impact will depend on how long oil prices stay low. Geopolitical factors stood out in the survey as a significant driver for Russian Arctic offshore hydrocarbon development---though technological and economic viability all weighed as significant for most. Global hydrocarbon demand can be dramatically shaped by war, disaster or technological breakthroughs by energy alternatives; political agreements can impact demand but are not seen as the equal of the former. It is not a

certainty that Russia's strategic objective of developing its offshore Arctic hydrocarbon reserves will progress on the pace necessary to provide the GDP backbone to sustain geopolitical ambitions. Potentially, other elements in energy market dynamics could significantly delay that development, or even in the short to mid-term, mitigate its criticality to the Russian economy, such as a boom in the economic vitality of other extractive techniques in its *onshore* oil and gas fields. But achieving the production potential, particularly of traditional crude oil, from its Kara Sea reserves, remains a viable harbinger in assessing the capacity of Russian central state to finance its mid-century national strategic ambitions.

Chapter 6 *Circumpolar* offshore Arctic hydrocarbon scenario development

6.1 Scenario workshop

As a means to augment this dissertation's research with additional expert input into the scenario development process, a workshop was planned and incorporated into the research design. In collaboration with the University of the Arctic (UArctic) Extractive Industries Thematic Network PhD program, augmented by participants from the Institute of the North's 2015 Arctic Energy Summit, the "Scenario Offshore Development Workshop" was conducted by University of Alaska Fairbanks Graduate School on the 27th of September, 2015. The session was not of sufficient duration to fully develop or achieve all the steps of a scenario development process. However, the uniquely expert group of 31 participants, from academia, industry and government, was able to identify and rank 54 drivers to help frame further analysis.

A short presentation on the theory and history of scenario development was provided as an introduction to the session by the facilitator, Dr. Lawson Brigham (this researcher's committee chair). The intent of the scenarios process is to identify and differentiate between key drivers that can influence future change from the predetermined elements that are assumed to hold relatively constant azimuths. Scenario futures are not attempts to forecast or predict linear projections into the future. Rather they are to best prepare future decisions makers for the range of uncertainties that can influence the future. The methodology developed by the Global Business Network (GBN) and utilized for the Arctic Council's (ACs) *Arctic Marine Shipping Assessment* was provided for background and context along with examples from that ground breaking process. Dr. Brigham outlined the parameters of the workshop and provided some basic rules. The discussion would be facilitated; it was not free ranging open discussion. Each participant was given the opportunity to nominate at least one key driver or uncertainty that they envisioned would significantly impact (or drive) the prospects of Arctic offshore hydrocarbon development. The scenario parameter of 25 years (2040) was utilized as it is a good general benchmark for a large offshore hydrocarbon project in Arctic conditions to cycle from an economically viable discovery to full production. What are the key drivers, forces and uncertainties for future Arctic offshore hydro development? Those nominated were recorded on butcher block (posters) and visible to all in the conference. The group identified 54 drivers and

then had the opportunity to vote (maximum 10 votes per participant) on which were the most significant.

It is important to emphasize that the working group's guidance was to consider circumpolar wide offshore hydrocarbon development, and was not limited to the Kara Sea. Both the researcher and Dr. Brigham determined a Kara Sea focus too narrow for this specific forum. The intent was to develop an Arctic wide scenario process to set the stage as well and to enrich subsequent and specific Kara Sea alternative futures (Chapter 7). It was believed an initial or baseline circumpolar framework of prioritized drivers formed by a group of experts external to the researcher's own analysis would contribute a measure of validity. Participation and affiliation in the workshop is provided in Appendix B.

6.2 Workshop results

The 54 drivers of Arctic offshore hydrocarbon development identified and ranked by the workshop group are listed in the table below

Table 6.1 Raw driver results and ranking by votes

1. **Power, safety issue ---State power (12)**
2. **Ability of industry to foster best practices (11)**
3. **Global need for hydrocarbons (10)**
4. **Advances in technology (9)**
5. **Major oil spill accident (9)**
6. **Sea ice extent – marine access (9)**
7. **Global price of oil (8)**
8. **Demonstrated failure of alternatives (8)**
9. **Greater knowledge of Arctic – less development (8)**
10. **New discovery of hydrocarbons (7)**
11. **Newly discovered fields in easier location – Gulf of Mexico (7)**

12. Global political situation (e.g. Ukraine) (6)
13. Environmental political pressure – NGOs (6)
14. Russia-China conflict/friction (5)
15. Indigenous sovereignty issues (4)
16. Fresh water needed from Arctic for elsewhere in world---requires use of energy (4)
17. Regulatory environment (4)
18. Infrastructure availability and development (4)
19. Economic growth in non-developed world (4)
20. Renewable growth energy growth (less hydrocarbon development (4)
21. Cost reducing technology for arctic hydrocarbons (4)
22. Technology in oil and gas industry (4)
23. Native corporations (Alaska) (3)
24. Global price of gas (3)
25. War in Mideast (3)
26. Industry access to capital (3)
27. Future US-Russian relations (3)
28. Social media evolution (small group influence) (3)
29. Increase in arctic populations – more demand (3)
30. Emerging market-energy growth (2)
31. World pop growth (2)
32. End of shale gas rev (2)
33. Continued of US EU sanctions (2)
34. Saudi policies in oil markets (2)
35. Regulatory speed (2)
36. Arctic land grab-seabed (2)
37. Food security (2)
38. Piracy and terrorism, more sensible/safer than elsewhere (2)
39. Carbon taxing in major economies (2)
40. Leadership in oil in gas industry (2)
41. Insurance industry underwriting arctic (2)
42. New energy technologies--(e.g. fracking (1)
43. Large NGO protests (1)
44. Risk prevention capacity-ability (1)
45. Shift oil to NG globally (1)
46. Energy security access (1)
47. Political cooperation (1)
48. Ability to close knowledge gap through cooperation (1)
49. Securitization – military (0)
50. Pope-religious leadership (0)
51. More arctic tourism (0)
52. CAN-US Keystone pipeline decisions (0)
53. Long reach drilling-OCS (0)
54. Changes in employment in oil and gas---- access to skilled employees (0)

6.3 Workshop conclusion and refinement of drivers

The workshop concluded on 27 September, 2016, with the preceding combined list of ranked key drivers and uncertainties. Utilizing this initial phase as a framework, this researcher further refined the analysis borrowing from a process developed by GBN and utilized for AMSA's, *The Future of the Arctic Marine Navigation in Mid-Century* (GBN, 2007).

Other substantively relevant scenario projects were reviewed, particularly for applicability of method. The World Economic Forum's *Scenarios for the Russian Federation* (2013), *The Future Availability of Natural Resources: a New Paradigm for Global Resource Availability* (2014) and *Future Oil Demand Scenarios* (2016) were all stimulating for envisioning detail and future indicators. The scenario method employed for "Barents Sea Oil and Gas 2025 (Øverland et al. 2015)," was the closet reviewed to the GBN methodology employed in this dissertation, and also closest to the regional and thematic focus of this dissertation's objectives. A notable difference in "method" was that the Barents' scenarios did not employ the cross-axis approach of framing focused quadrants (as a tool for differentiating the narratives to follow) with the most relevant critical uncertainties; a step, derived from GBN, which this researcher considered a valuable process contribution.

The drivers previously identified in Table 6.1, were further tightened in wording to best meet the inferred intent of the workshop by this researcher. Those that were similar were combined and those with few votes parsed but not eliminated as they still have value for scenario narrative detail. For transparency, this refinement step is presented in Table 6.2.

Table 6.2 Refining key drivers

#1 **Power, safety issue --- State power** (12 votes) was reworded to **State sovereignty** *(12 remains 12 votes)*. Note: wording was refined to best reflect expressed intent in group discussion.

#3 **Global need for hydrocarbons** (10 votes) + #8 **Demonstrated failure of alternatives** (8 votes) = **Global demand for hydrocarbons** (combined 18 votes). Note: Refined driver best captures impact for a 25-year end state.

#9 **Greater knowledge of Arctic – less development** (8 votes) + # 11 **Environmental political pressure – NGOs** (6 votes) was reworded to = **Environmental activism** (17 votes combined).

#10. **New discovery of hydrocarbons** (7 votes) + #11 **Newly discovered fields in easier location – Gulf of Mexico** (7 votes) = **Discoveries in non-Arctic regions** (14 votes combined).

#4 **Advances in technology** (9 votes) + #2 **Cost reducing technology for Artic hydrocarbons** (4 votes) + #22 **Technology in oil and gas industry** (4 votes) = **Advances in extraction technology** (17 votes combined). Note: Best captures scenario end state of driver.

#5 **Ability of industry to foster best practices** (11 votes) was reworded to **Industry best practices** for brevity (votes remain at 11).

#10 **Global political situation (e.g. Ukraine)** (6 votes) + #27 **Future US-Russian relations** (3 votes) + # 33 **Continued of US EU sanctions** (2 votes) + #14 **Russia-China conflict/friction** (5 votes) = were reworded and combined to form new driver; **Geopolitical Influences** (16 combined votes). Note: From a 25-year scenario perspective combined driver best weighs and captures sentiment.

The refined top 10 key drivers are listed in Table 6.3 below. The remaining drivers 11 through 46 were utilized to help stimulate detail in the creation of the scenario narratives (Chapter 7).

Table 6.3 Results of driver refinement

1. **Global demand for hydrocarbons (18)**
2. **Environmental activism (17)**
3. **Advances in extraction technology (17)**
4. **Geopolitical Influences (16)**
5. **Discoveries in non-Arctic regions (14)**
6. **State sovereignty (12)**
7. **Industry best practices (11)**
8. **Major oil spill accident (9)**
9. **Sea ice extent – marine access (9)**
10. **Global price of oil (8)**

11. Indigenous sovereignty issues (4)
12. Fresh water needed from Arctic for elsewhere in world---requires use of energy (4)
13. Regulatory environment (4)
14. Infrastructure availability and development (4)
15. Economic growth in non-developed world (4)
16. Renewable growth energy growth (less hydrocarbon development (4)
17. Native corporations (Alaska) (3)
18. Global price of gas (3)
19. War in Mideast (3)
20. Industry access to capital (3)
21. Social media evolution (small group influence) (3)
22. Increase in arctic populations – more demand (3)
23. Emerging market-energy growth (2)
24. World pop growth (2)
25. End of shale gas rev (2)
26. Saudi policies in oil markets (2)
27. Regulatory speed (2)
28. Arctic land grab-seabed (2)
29. Food security (2)
30. Piracy and terrorism, more sensible/safer than elsewhere (2)
31. Carbon taxing in major economies (2)
32. Leadership in oil in gas industry (2)
33. Insurance industry underwriting arctic (2)
34. New energy technologies--e.g. fracking (1)
35. Large NGO protests (1)
36. Risk prevention capacity-ability (1)
37. Shift oil to NG globally (1)
38. Energy security access (1)
39. Political cooperation (1)
40. Ability to close knowledge gap through cooperation (1)
41. Securitization – military (0)
42. Pope-religious leadership (0)
43. More arctic tourism (0)
44. CAN-US Keystone pipeline decisions (0)
45. Long reach drilling-OCS (0)
46. Changes in employment in oil and gas----- access to skilled employees (0)

6.3.1 Wildcards

Also identified by the researcher were "wildcards," or drivers that have a low probability of happening, but if they did occur, would have a dramatic causal effect. Therefore, in keeping with the scenario design parameters they were excluded.

- Strategic global war
- War in the Mideast (on the scale of dramatic regime changes or other severe instability to global core suppliers forcing withdrawal from the global oil market, e.g. Saudi Arabia)
- Disease, plague or other pathological occurrence of a global magnitude that rewrites energy demand; outside even the most modest expectations of economic growth
- Rapid change in global currents on a macro-level with enough effect to significantly change market dynamics
- Unpredicted cataclysmic atmospheric or geological event
- Discovery of a now *unknown* strategic energy source

6.3.2 Framing and defining linear endpoints

Endpoints were also identified for 10 linear axes shown below (Figure 6.1 and 6.2) from a 25-year perspective. For example, axis #1 **global demand for hydrocarbons** has *endpoints* defined by "decreased demand" and "global scarcity." These endpoints help frame the later stage of narrative creation. This assessment process incorporated the methodology utilized by GBN in the AMSA project. Future importance and uncertainty for circumpolar Arctic offshore hydrocarbon development.

1. Global demand for hydrocarbons

Decreased demand
(Alternatives become competitive, dramatic rise in efficiency)

Global scarcity
(More accessible reserves no longer- available. Arctic offshore "last place on earth" decline in global economy)

Development of the offshore Arctic regions is highly sensitive to global hydrocarbon demand. Though not as volatile as the "price" of oil, global energy demand, and specifically hydrocarbon demand approaching mid-century, is central to the course of our civilization. As a driver of offshore Arctic hydrocarbon development, absent a *wildcard* or *black swan* event.

2. Environmental activism

High sensitivity
(Arctic uniqueness preserved)

Tertiary regard
(Arctic development driven by market and nation-state objectives)

Environmental awareness and its impact on Arctic and offshore development has demonstratively been a driver in the 21st century beyond the moral or ethical. It can, and has, derailed some of the largest extraction projects. But it is also dependent on the overall stability of the international system.

3. Advances in extraction technology

Not economic
(Advances in Arctic offshore hydrocarbon extraction technology not completive or as competitive for the Arctic offshore)

Cost effective
(Technology available and viable)

The necessary technology to extract the hydrocarbons in the Arctic offshore to meet the mid-century strategic objectives of some of the largest IOCs and Arctic States exists. But it is not necessarily available at an economically competitive cost or shared in a collaborative manner across corporations and States.

4. Geopolitical influences

Zero sum game
(Unstable world order, high competiveness, little industry integration)

International governance
(Stable, prosperous, orderly offshore development)

War or peace? Perhaps the ultimate uncertainty. What is more assured is that the geopolitical drivers that will impact hydrocarbon extraction in the Arctic offshore, such as an internationally stable, collaborative, or even cooperative political structures---will be driven by global variables more than regional ones.

5. Discoveries in non-Arctic regions

New global reserves discovered
(New hydrocarbon discoveries reduce viability or cost-competiveness of Arctic extraction)

No alternative
(The Arctic offshore is the last bastion of crude oil)

Traditionally extracted crude oil is the primary driver. Gas extraction may follow in parallel however, economically viable, by being anchored with the infrastructure necessary to produce the crude oil. Twenty-five years is not necessarily a long time for energy based strategic planning. Projects of the scale needed to produce hydrocarbons from new reserves, such as in the Arctic offshore regions, in "good" times take about that much time (25 years) to bring into full production. Therefore, the likelihood of economically viable discoveries that will displace the value of the predicted but unproven Arctic offshore potential is assessed as low.

Figure 6.1 Framing the key drivers

6. State sovereignty

Low maritime security
(Strength of State sovereignty in the Arctic offshore is weak)

Enforceable EEZs
(Environmental regulations and internationally agreed standards are rigorous)

The sovereignty axis of uncertainty implies a synergistic relationship with international standards, enforcement regimes and *capacity* to regulate. Enhanced sovereignty effectiveness is dependent on resources and infrastructure (paying for it), and determined need.

7. Industry best practices

Weak standards
(Ad hoc and regional variations)

Rigorous
(International standards adhered to in all of Arctic offshore)

Corporate social responsibility is implied on this axis as well. High standards require high capital investment. The IOCs generally have the capacity to employ best practices commensurate with their technology, management and financial mass. NOCs have a more varied track record. Industry employment of best practices in the offshore Arctic is therefore measurably dependent on the degree or ratio of their involvement with the NOCs (particularly in Russia) which control the predominate share of the reserves. Another unknown factor is to what degree new emerging hydrocarbon capacity, in Chinese NOCs for example, can or will replicate current IOCs now operating.

8. Major oil spill accident

Severe environmental damage
(International indignation)

Successfully contained
(Offshore development set a milestone for effective and responsible development)

There is significant potential for a moratorium on offshore development in the Arctic if response to a major oil spill is ineffective. This could well hold true even if the hydrocarbon accident occurred elsewhere in the world with a project with no industry ownership or nation-state ties to the Arctic. This axis is also impacted by the stability of international, especially Arctic nation and industry, relations. The more stability, the more cooperative engagement in forums such as the Arctic Council, to have and to mature mitigation measures.

9. Sea ice extent – marine access

Access remains difficult
(Little change in the next 25 years and/or erratic weather patterns)

Seasonal access dramatically improved
(Arctic maritime transit and access much opened with lengthened summer season)

This axis focus is limited to hydrocarbon extraction in the Arctic offshore regions. Climate change impacts, such as an extending and predicable ice transit season, implies less economic extraction costs. However, the oscillations in the speed and variance of climate change for the maritime Arctic is difficult to predict.

10. Global price of oil

Low
(Low price, makes investment in Arctic offshore development unviable)

High
(Arctic worth the cost of investment)

The duration of oil prices is arguably as significant as the actual price. Strategic oil development for the mega projects needed are made on long-term projections of rate of global economic growth, geopolitical stability and other market variables---not simply "price" which has a symbiotic relationship with supply and demand.

Figure 6.2 Framing the key drivers continued

6.3.3 Matrix development: assessing the critical uncertainties

The next phase of analysis assessed both the future *importance* and *uncertainty* of the key drivers for circumpolar Arctic offshore hydrocarbon development in the next 25 years. To progress to scenario narrative creation in Chapter 7, the *critical uncertainty* of a key driver was deemed of most value for the creation of matrices and to define quadrant outlines. If a driver was relatively certain, it was determined to have less inherent value in enriching future decision making processes. Various combinations of axes from the proceeding analyses of the top ten key drivers were crossed in pairs and evaluated for their utility in framing a set of future narratives. "Criteria for choosing the (final) matrix included plausibility, divergence, relevance and challenge---as well as the 'right' level of external forces" (Global Business Network 2007, 15). Six candidate matrix combinations were created by pairing and crossing the axes defined and developed in Figures 6.1 and 6.2.

Of the six matrices depicted in Figure 6.3, the two that were assessed as most *critical* and *uncertain* were **#4** Global demand for hydrocarbons - Geopolitical influences; and **#5** Global demand for hydrocarbon - State sovereignty. It was further assessed that while #5 (demand and sovereignty) could be incorporated as a subset into a scenario storyline framed by #4 (demand and geopolitics), the reverse was less the case. With the judgement that it promised the most utility for progression, the crossed matrix pairing of **Global demand for hydrocarbon**s with **Geopolitical influences** was chosen for defining the four quadrants; the next and final step before narrative creation (Chapter 7). (Note: that for graphic display purposes the axis "Global demand for hydrocarbons" has been shortened to **Demand for hydrocarbons**.)

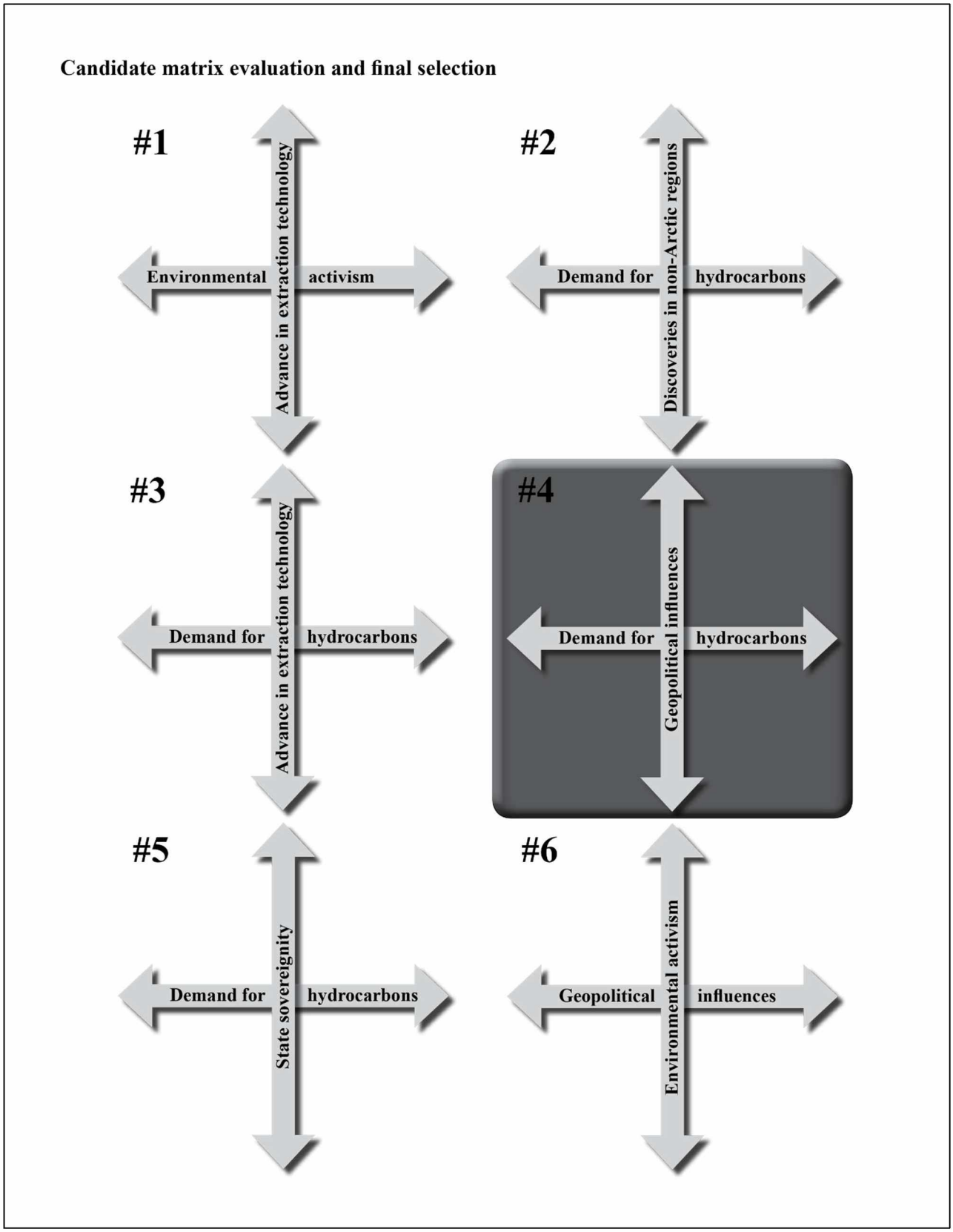


Figure 6.3 Candidate matrix evaluation and final selection

6.3.4 Framing of narrative quadrants

The final matrix (Figure 6.4) framed the assessed, two most critical uncertainties, to allow for an exploration of how causal factors (drivers) might interact in four closed complex systems. In each quadrant an overview of the causal factors (drivers) for a *circumpolar* offshore Arctic hydrocarbon future has been sketched out as well.

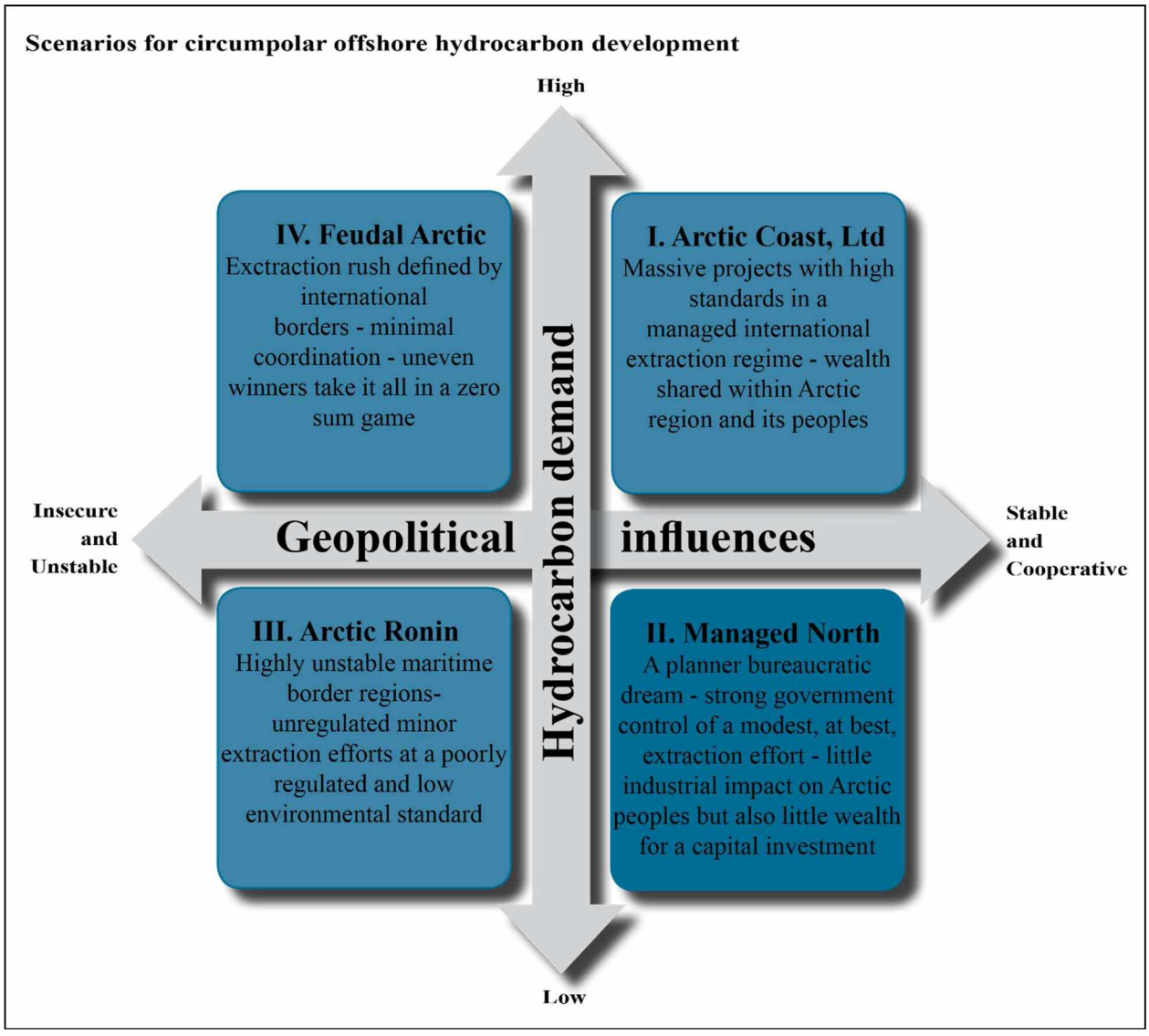


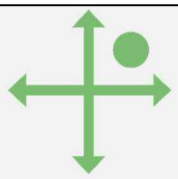
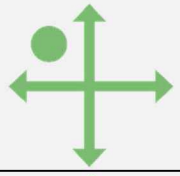
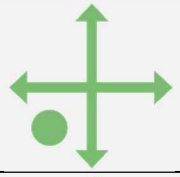
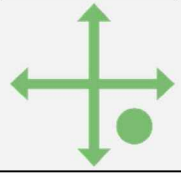
Figure 6.4 Scenarios for circumpolar offshore hydrocarbon development

Chapter 7 Scenario narratives

7.1 Scenarios: alternative futures for hydrocarbon development in the Kara Sea

The results of the analysis in the preceding Chapter 6 included key driver analysis, identification of critical uncertainties, and matrix development for *circumpolar* offshore Arctic hydrocarbon development. Building on that effort, with the incorporation of details and key findings from the survey-interview effort presented in Chapter 5, more specific to the Russian offshore and the Kara Sea, the geographic context of the scenarios was narrowed. It was readily apparent with this step that no future model could focus on the Kara Sea, or even the Russian offshore region in isolation, and therefore, the regional centerpiece adopted was the western Russian maritime Arctic. The matrix and its four framed scenario story lines deemed most illustrative at the conclusion of Chapter 6's analysis, Figure 6.4 "Scenarios for circumpolar offshore hydrocarbon development," was the basis for this narrowing transition. Table 7.1 below represents that refinement. The framing uncertainties (axis) and their endpoints remained the same; *Geopolitical Influences* crossed with *Hydrocarbon Demand*. Figure 7.1 was the resultant and last process step for the four scenarios which follow.

Table 7.1 Circumpolar offshore *tightened* to western Russian maritime Arctic

Arctic Coast, Ltd →	High hydrocarbon demand, cooperative geopolitical setting	Western Arctic Maritime Union →	
Feudal Arctic →	High demand and unstable governance	Kara Industrial Security Region →	
Arctic Ronin →	Low demand in an insecure political environment	Special Export Zone Kara →	
Managed North →	Low demand market in a cooperative international system	Arctic Shelf Ecological Park →	

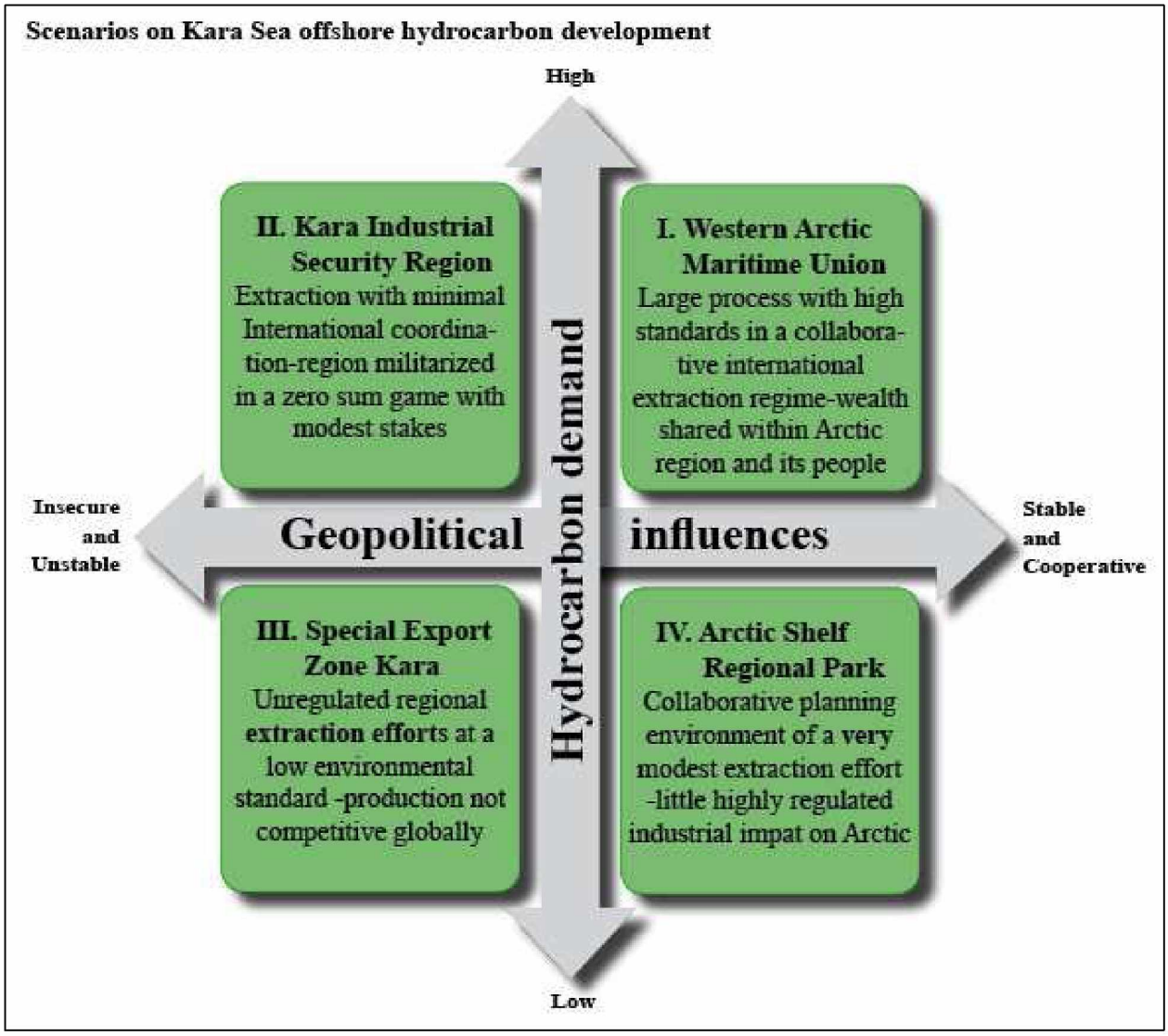


Figure 7.1 Scenarios on Kara Sea offshore hydrocarbon development

7.2 Future for Kara Sea offshore hydrocarbon extraction

7.2.1 Western Arctic Maritime Union (WAMU)

2016-2025…Beginning from the end

The preceding decade was geopolitically the most turbulent for relations between the major world powers since the Cold War; and Russia was in the center of that disruption. The

Georgian six-day war in 2008, followed by the annexation of Crimea and war in the Ukraine in 2014, were not distant proxy confrontations but featured direct military engagement by the Russian Federation and sovereign states on its border---disrupting the seemingly peaceful progressing assumptions of decades of diplomacy. In a great part of the developing world long-festering global divisions remained energized with no predictable resolution to critical matters such as, e.g. Iranian re-entry in the international system and the balancing of severe social demand with regime objectives and capacity. And in 2014 the strategic hydrocarbon extraction plans of the world's largest and most capable International Oil Corporation (IOC), its Russian JV partner, and the Russian Federation itself came to a highly visible abrupt halt in the Kara Sea. There, the first exploratory drilling of arguably the world's greatest remaining undiscovered and recoverable strategic oil reserve showed initial high potential---then was shut down immediately by targeted, punitive, Western sanctions on the critical capacities needed by Russia for its Arctic offshore strategic plans. Despite much speculation of an early collapse, the political will of the united West held fast and Russian sanctions remained in place. But it was the parallel market crash in the price of oil that provided the coup de grace for the rest of the decade to investment in Russian offshore oil. By 2020 Russia's once robust Reserve and National Wealth Funds were completely depleted and the Federation's reserves returned to the same red ink not seen since the dark budget crisis days of 2008. Initially Russia's lower middle class, the Orthodox Church and the media, remained loyal to newly re-elected (2018) President Putin as did the great majority of the regional governments. Allegiance to the officially propagated tenants of "mother Russia" and nationalism still held with help from the security apparatus. Though significant dissent in the upper middle classes reemerged as in 2011, in Moscow and St Petersburg, there was no significant organized revolt.

But what did prove politically decisive for Russia was a dramatic schism within the ruling elite itself brought on by an ironic cataclysmic, re-privatization of the "Crown Jewels" of Russia's extractive industries, Rosneft and Gazprom ---the oil and gas sectors most powerful and government majority controlled corporations. In an inverse of Chubais' relic "Shares for Vouchers" auctions of the Yeltsin era, it was the derisively dubbed new "Shares for Dachas" plan that brought an end to the Putin era. Introduced by the Kremlin itself, amidst a lingering glut in oil supply as an attempt to duplicate the highly successful Initial Private Offering (IPO) of

20% of Saudi Aramco, the world's largest National Oil Corporation (NOC), Russia's re-capitalization plan triggered an unexpected shattering of the cooperative pact within the Russian elite---the leaders of the Central State, Siloviki (security services) and the new generation of industry oligarchs who could no longer continue to "get rich together." Though the largest segment of the population remained relatively reconciled to a diminishing Russian economy, the wealthiest of the industrial leaders and a small but highly energized budding entrepreneur class came to understand that true reinvestment by global capital could not be energized with only the participation of Eurasian, pariah and fringe participants. Real value for corporate shares that was needed to re-start the economy and preserve the individual portfolios of Russia's wealthiest few had to come from an open competitive market. With a secure very golden nest egg, and a mechanical, heavy handed, but nonetheless achieved international recognition of Russian great power interests from the ebbs of the Post-Soviet collapse---President Putin reached an agreement with his own business elite and served out a final term.

Russia's parliament became more efficient once outside Putin's shadow and over time the beginnings of a measured media opening and re-emergence of political parties became discernable---all in a modest and very much traditionally Russian form. Very significant for the domestic economy, with sanctions gone, Russia began reintegrating into global oil and gas markets by 2025 enabling investment timelines to begin reconsidering once again the big hydrocarbon projects ahead.

2025-2040…Kara Sea right place and the right time…barely

The global supply and demand balance had absorbed the re-entry of Iran and a stabilized Iraq and Libya, but for Russia, the Saudi Arabian experiment in privatization remained as the biggest market damper for revival of the mega-offshore Arctic projects envisioned in the millennium's first decade. Part of the earlier allure to the Russian frontier regions was the attraction of new "reserves" IOCs like ExxonMobil could list on their ledger sheet and boost share values. The market opening of privatization of NOCs, initiated on a large scale by Saudi Arabia, followed by Mexico, Nigeria, Brazil and other Gulf States also mitigated the super-major IOCs strategic plans and investment in exploration. Nonetheless, an increase in oil demand continued to be driven by an even more globalizing economy in the less developed nations

coupled with continuing appeal of Natural Gas (NG), especially from within the politically revitalized European Union (EU), which had mandated coal elimination by 2030. China and India, in the spirit of the 2015 Paris Climate Accords, continued their incremental transition from coal to NG. It was also evident by then that alternative energy sources, despite great advances in pure research, e.g. alternatives for lithium batteries which promised to make the sodium alternative much more viable---would not be marketable on a global scale until mid-century.

It was in this economic and market environment of 2030, when the hydrocarbon supply and demand dynamic was once again favorable for global industry, that the Barents-Kara Sea region found itself positioned for emergence into an integrated powerhouse of Arctic hydrocarbon development. This was attributable to the magnitude of the initial anchor offshore "elephant" or very large, dense and economically viable fields, and the economics of scale afforded by broad regional investment. This allowed for a continued rolling out of the exploration frontier to less promising, but viable satellite fields --- when they could be linked to the infrastructure established for the anchor fields. But it was political developments, both international and regional, that enabled the regions potential to reach fruition. Geopolitical rivalries had stabilized as the Putin era drifted to an anti-climactic close and IOCs continued a measured re-engagement in Russia's offshore Arctic regions, still considered the world's largest unexploited reserve. What had long been absent in Russia, a regulatory maturity allowing for sustained business integration of best practices in technology and management---had reached a tipping point. With oil demand again on track for another long run of out stripping marketable supply, the economic benefit to Russia of increasing but also stabilizing the greatest source of the nation's export earnings was grasped by a new class of "third estate" leaders who had built their careers and fortunes usurping the benefits of disequilibrium. A firming of the rule of law could now benefit, if not a wider segment of Russia's population, a newer group without a tradition of authority and wealth. It had long been understood and unambiguously transparent in Russia strategic policy documents that future wealth and prosperity depended on refurbishing its Arctic infrastructure and bringing into production its undeveloped resources, primarily hydrocarbons. But the unresolved dilemma, was equally well understood; Russia needed the very best in petroleum extraction technology, managerial capacity as well as investment from an industry largely based in foreign states that more often than not were geopolitical adversaries.

The international region building efforts dating back to the previous century had preserved its roots and the Arctic Council's capacity expanded beyond consensus making into new areas of soft law and even collaboration on funding allocations to support a mutually agreed landmark "Code of Indigenous Rights." With the real price of a barrel of oil steadying above the high mark of 25 years earlier, Russia and its Arctic partners were ready now to engage in regional economic, but also social and political, forums necessary to build in the Arctic a competitive zone of commerce centered on the legacy infrastructure in the North Sea combined with frontier developments in the Barents and Southern Kara Seas. Politically, the Western Arctic Maritime Union (WAMU) foundation was the earlier but long dormant framework of the Barents-Euro Arctic Council (BEAC) and the Barents 2020 initiative.

Plausible conclusion…towards a universal *global* perspective

The WAMU's rapidly progressing economic synergy in the very first year of its implementation in 2035 provided the new Kremlin leadership confidence for further cross-sovereign border regional integration. Using the WAMU as model, real regional integration proposals were being negotiated for Western Asian and the Caucuses as well, the key facilitating driver being a sufficient, achievable and clearly identifiable---competitive mass in the global economy---in these cases all fueled by hydrocarbons. The massive NG reserves ashore and underlying the Barents and Kara basins, normally marketable on the margins, proved lucrative when tied to newly developed clustered infrastructure built for crude oil extraction. A global political maturity had also finally resurrected the broken dream of a spot market for Liquid Natural Gas (LNG) advancing the WAMU's Sabetta NG and Northern Sea Route (NSR) on the Yamal Peninsula into an *Arctic energy hub of commerce*. Continued "climate transition" on the warming earth significantly extended the seasonally navigable portions of the NSR allowing for more predictable risk for insurance underwriters and firmer scheduling of extractive destination shipping. This further contributed to the competiveness of the WAMU. Massive cross sovereign border projects which mandated high international safety and environmental standards, such as those that proved necessary to form and make the WAMU competitive, had the money to significantly contribute to regional welfare, which to a large degree, neutralized the more extreme environmental groups---especially in the region. It is not an understatement to conclude that had there been a longer period of supply glut, and suppressed oil prices, the investments

necessary would never have been in the large capitally intensive Arctic offshore projects, that came on line just in time to allow for a resurgent global economy consuming, by near mid-century, 140 million barrels a day. Russia, progressing more firmly than ever before into inclusive systems of economically based, but politically integrated institutions, would by mid-century be characterized by foreign policy choices reflective of the collective benefit of its regional partners.

7.2.2 Kara Industrial Security Region (KISR)

2016-2025…Progression or Return to a Mercantilism?

By 2020 Russian foreign and energy policy, the symbiotic core of the Central Government's (CG) political economy, with few other options, continued a bid to alter the global power sharing status quo. And in that context, offshore hydrocarbon exploration and production in the Russia's Western Arctic remained tied as much to foreign policy as energy export objectives. President Putin, now entrenched in his fourth presidential term, savored his carefully crafted role as the geopolitical front man for the BRIC nations (Brazil, Russia, India and China) and all those who sought the end of the Bretton Woods institutions that had reigned all powerful for 75 post WWII years. It remained unclear what would emerge to replace the free market, multi-lateral trade agreement and treaty structures that rested on the International Monetary Fund (IMF) and World Bank (WB); but Russia with the quiet backing of China, India and much of the developing world, were making gains in breaking the comparative institutional advantages long held by the US and its status quo allies. Significantly, the timing of an institutional disunion agenda coincided with nationalist resurgence within a devolving European Union (EU).

Western solidarity for punitive sanctions on the Russian energy sector had collapsed in 2017 when Germany, Italy and Greece broke ranks with EU Energy Ministry. Germany had pre-warned diplomatically for some time their approval of the Nord-Stream 2 pipeline which would bring directly into its borders Natural Gas (NG) on very favorable long term contracted prices from Russia's Gazprom---but the joining in of the Adriatic States shocked ministers in Brussels.

Italy's ENI corporation further eroded coordinated EU control by its JV partnership with the National Iranian Oil Corporation (NIOC). Parallel to the fracturing of energy policy harmony the EU political union was shaken as well by the violent turn of the independence movement in Spain's Catalonia region.

Oil prices remained low early into the 2020s as the Saudis appeared on the verge of finally winning the" war of supply." Though the US production resurgence brought on by the shale oil and gas fracking revolution a decade earlier proved more resilient than expected, the strain on the financial structures that provided the critical venture capital for the North American wildcat pioneers collapsed, and with it, the US production peak. The re-entrance and integration of Iran Heavy Crude into the global marketplace also contributed to a sustained market downturn. But it was the challenges to the foundation of the global political economy of progressive free trade that would define the next epoch.

2025 to 2040…Towards regional energy fiefdoms

In the previous decade a regional pipeline infrastructure had grown to fruition in Africa with the benefit of Chinese and International Oil Corporations (IOCs) capital linking South Africa to NG in Mozambique and in the west from Angola for South Atlantic export. The Uganda-Kenya crude oil pipeline provided a new alternative for export passage in the Indian Ocean without the potential threat of naval interdiction, in event of war, of the Strait of Hormuz (SOH) maritime chokepoint. Investment in Liquid Natural Gas (LNG) had peaked before 2020 as muted global economic growth had hindered investment. Nonetheless, some large projects in Western Australia and Qatar continued where mercantile conditions of comparative advantage in LNG were the strongest. Likewise, Russia's Sabetta LNG on the Yamal Peninsula in the Kara Sea also made headway with the use of national "strategic" funds and equally long sighted investment from capital sourced in China and India. The Northern Sea Route (NSR) saw continued infrastructure developments as Russia sought to refurbish Cold War era ports and maritime underpinnings.

Hydrocarbon production from the North Sea halved by 2025 and flowed at only 800,000 barrels a day. Norway turned north to her Arctic shelf and Barents Sea with new leases for

exploration and investment incentives, but Britain turned east. In what proved the final blow to the never realized "consistent and centralized" EU energy policy, Britain joined with Russia's Gazprom in a Nord-Steam 2 pipeline extension all the way to the shores of the kingdom.

By 2030 the international order, in a lethargic equilibrium, was rocked by the seminal disaster of the new century off the coast of the Cotentin peninsula. The *Atlantic Stork,* a 4,000-ton British owned special purpose-built transport for High Level Waste (HLW) of nuclear reactor material, securely stored in 10 Type B casks, departed Cherbourg France en route disposal in Australia. The voyage was a routine transit done multiple times every year as part of a global nuclear energy system tightly regulated and monitored by the Internarial Atomic Energy Agency (IAEA). This type of routine event had occurred without major mishap since the first published standards and regulations in 1961. France, the global leader in nuclear generated electricity, had emerged as the unanticipated bedrock of the EU's transition from the hydrocarbons as outlined in the 2015 Paris Accords, and since mandated by the union's Energy Ministry. This nuclear capacity had provided needed time for the incrementally more efficient---but still more costly ---programmed wind, battery and solar alternatives. But the *Atlantic Stork,* though well designed for securing radioactive waste from navigational miscalculation or accident --- proved not hardened enough for a complex terrorist attack instigated from within its own onboard security detail. The attack began while still in French waters and before supporting assets could secure the cargo. The terrorists compromised the Class B casks before the firefight and succeeded in scuttling the ship. Contamination risk was real but containable in the open sea. However, a frenzied media response erupted around the world --- video of the coastal cliffs rising above the wreckage became the singular image and harbinger of the true collapse of the post WWII global independence era. Within a year after "Cherbourg," the Netherlands, voted in referendum to follow Britain and withdrawal from the EU --- signaling a complete loss of faith, at its center, in a European security structure.

The previous 20 years had not proven lucrative for significant hydrocarbon exploration and development --- especially on the geographic and technological frontiers. The global oil and gas markets had avoided roller coaster ups and downs for almost two decades. Stagnated world trade had contributed to a consumption rise of only a modest 110 million barrels per day, up

from 100 million barrels. Infrastructure improvements and new pipelines in the developing world contributed to regionally entrenched, but stable, NG markets. All was well until it wasn't.

In response to "Cherbourg" environmental protest rose to never before seen levels of political influence ---- especially in Europe, North America and Japan. Presidents, prime ministers and parliaments had lost the initiative in implementing a coordinated strategic response to climate change first articulated in the Paris Accords in 2015 --- and codified 10 years later in New Delhi. The German Bundestag demanded its newly formed government cease all nuclear derived electricity imports, contracted or not, as did newly empowered environmental activist parliaments across Northern and Southern Europe. With alternative energy sources not yet capable of meeting even a rationed consumption-demand; with coal long since banned; pipeline sourced NG already contracted at or near capacity --- the LNG spot market took off in a manner reminiscent of historical embargo driven crude oil spikes.

Plausible conclusion: return to Westphalia?

Russia, though never realizing the great promise of offshore hydrocarbon investment and high technology transfers from the IOCs envisioned 25 to 30 years earlier, had nonetheless, developed its near shore oil and gas fields in the Southern Kara and Barents Sea, and in particular, had successfully completed what was now the world's second largest operating LNG port at Sabetta on the shores of the Southern Kara Sea. Fortuitously, the LNG tanker fleet, overbuilt in 2020, was not scrapped as market analysts would have predicted, but held in reserve at central government cost for strategic reasons. Russia found itself well positioned to take advantage of the energy crisis of the late 2030s. The Russian Western Arctic, with the Central and regional governments full collaboration, was in a full bore gas boom. While industry competitors in the Norwegian and Barents Sea, in Alaska and off the Canadian and Greenland coasts, struggled through a regulatory maze to implement mothballed development plans --- no such delays hampered extraction in the less transparent Russian Arctic. Global environmental protests after Cherbourg moved past a nuclear energy ban agenda to a renewed and concerted effort to ban all Arctic extractive development. In response to a half dozen protest incidents along its western approaches, the Northern Sea Route (NSR) Administrative zone was further restricted to central government approved transits which became almost exclusively an extractive

industry destination shipping on Russian or other specifically approved flag carriers, owners and crews---serving Russian or Chinese interests.

The Arctic Council had remained until now the one international forum where Russia remained a cooperative and engaged leader, though efforts to expand its charter mandate beyond and consensus building, on oil and gas industry operating standards and best practices, was an early casualty of geopolitical, rather than Arctic specific contention. But in the late 2030s another maritime incident would bring to an end even the Arctic specific mediation of the AC --- and have lingering strategic consequences in a markedly new era.

In 2040, by fortune or misfortune, a Scandinavian national media film crew were on site in the Barents Sea when a mixed international indigenous rights and environmental activist group attempted a peaceful "slowdown" of a westbound LNG tanker transit by the use of inflatable barriers, a tactic that had worked successfully outside Rotterdam earlier in the year. The barrier had been secretly positioned a mile inside Norwegian waters, nonetheless the privately contracted Russian security team responded with automatic weapons and a very visual loss of life of over 40 unarmed activists. Russia officially praised the shipboard use of force, and tone deaf to diplomatic condemnation, proclaimed a new Kara Industrial Security Region (KISR) encompassing their entire western Arctic Exclusive Economic Zone (EEZ) which was now considered sovereign waters. The other AC nations suspended interactions with their Russian counterparts. The Kremlin reiterated its position and superimposed its naval Northern Fleet over the Coast Guard and NSR in the newly formed KISR. War did not break out---but the interdependent era had taken a final turn to a sovereign regional one, and with it, a much weakened potential for Russian collaborative on policy adoption for climate or any other global challenges to come.

7.2.3 Special Export Zone Kara (SEZK)

2016-2025…USSR light

The latent major geopolitical power readjustment between US and China remained unresolved; as did an uncertain energy market. Global energy supply vs demand continued in relative equilibrium into 2020 as if on a linear forecasters PowerPoint slide. North American fracking production remained viable despite the Saudi led "supply war." The price of oil steadied below a $60 per barrel threshold, the North American drill rig count and shale oil production leveled and remained constant, and moderately profitable; but entrepreneur "wild cat" new investment had virtually ceased. Hydrocarbon exploration in the Arctic offshore, as well as the Mexican and Brazilian deep water which required new and advanced techniques was even less economically competitive. Plateaued "supply" market prices simply could not sustain investment in the new mega projects necessary in pioneer regions that did not already benefit from an existing extractive infrastructure. The major International Oil Corporations (IOCs), such as ExxonMobil, BP and Shell had been the first to cut back in these capital intensive high risk ventures --- but even the major National Oil Corporations (NOCs) and their hybrid sovereign, state "majority" corporately controlled cousins, such as Norway's Statoil, significantly slowed down new strategic mega developments by the early 2020s. The true consequence of these corporate - sovereign state decisions would come to fruition two decades later.

In Russia, the Central Government (CG) as dependent as ever on earnings from oil and gas exports, retained control of its weakening federation with increased suppression of ideological opposition, international academic exchange, and domestic media. By 2020 it was evident that the promise of an end to punitive Western sanctions had eroded as rapidly as had overall diplomatic relations. Russia was the unchallenged champion of the world's rogue states. However, despite heightened anti-Western rhetoric, the Kremlin grasped that the totalitarian tools of Stalin's USSR were not available. Nonetheless, with few options, a re-stocked and highly competent Russian Security Council moved forward with the logical conclusion of a Russian path for Russia's future, or "Russia for Russians." That path led to one last great central government *directed* gamble to harness all available aspects of bureaucratic power to regain

economic momentum and strategic initiative. Development of the frontier regions in the Arctic zone became an immediate national priority --- and one *not* directly correlated to current market conditions. The hydrocarbon extraction infrastructure and its supporting Northern Sea Route (NSR) received the last of the Federation's reserve funds. Construction of a six modern icebreakers and six polar class LNG tankers for a national fleet was expedited. A massive new offshore cluster pipeline system was begun, centered on Nova Zemlya, interconnecting the offshore oil and gas fields in the Southern Barents and Kara Seas to an export tanker terminal. Also jolted rapidly forward was new funding for air and naval bases in the maritime coastal Arctic region. Poor international relations with the West were further exasperated by an expedient de facto suspension of environmental compliance with international norms of "best practices" in the Arctic development zone. Russian participation in scientific and industrial forums had suffered, as did proportionately, international influence on Russian offshore hydrocarbon practices and standards.

In 2025 a platform rupture in the Prirazlomnoye oil field released 75,000 gallons of crude oil into the Pechora Sea. Though minor in a global historical context, the tardy Russian response, absence of ready international coordination and a highly visible oil slick drift into the Norwegian Southern Barents Sea resulted in an environmental outcry. Public outrage in Arctic Council permanent member states, especially in Norway, resulted in an emergency suspension of engagement with Russian representatives. Though the ministerial protest action was only temporary---it was a blow from which the AC, as a cooperative forum, never fully recovered.

2026-2040…The rise of the regions

"Russia for Russians" had by sheer focus achieved some success, but eventually stalled, exasperated by the political and market friction. The cost of the control initially deemed necessary. The challenges that drove the Arctic investment strategy were fundamentally as internal to Russia as external--- and remained so. A decade after the Kremlin had gambled, at all costs, on a prodigious Arctic extractive investment strategy --- the "bills" came due. The resources needed to maintain the basic social welfare status quo in a stagnant economy had been sacrificed. Funding had been diverted away, from what little was available, to train and educate the national workforce. The small and medium business entrepreneurs needed for a viable

domestic market economy remained stifled and the lower and middle classes become even more entrenched and reliant on personal networks for basic sustainment. With a few exceptions, such as arms exports, all that remained realizable was a raw material based economy --- and one evolving away from planned control. With little public capital, the capacity to link policy objectives to private investment declined. Direct investment from foreign private capital, especially from Asia, flowed unequally to specific Federal Regions further exasperating central cohesion and even superficial anti-corruption efforts. Siloviki bureaucrats (background in security services), themselves the new oligarchy class, maintained control of the Kremlin but were now reliant on chosen, or tolerated, Regional Government (RG) resource barons for maintaining a highly unequal social order and tax system. In the Arctic and offshore hydrocarbon heavy federal regions, special export zones were established to maximize revenue and maintain central government control. In the Western Arctic, the Special Export Zone Kara (SEZK) was established with an enforced exclusive maritime control not seen since the Cold War. Kremlin leadership were content harnessing wealth from the unequally prosperous regional districts--- but they were no longer aspiring to truly "direct" Russia's economic fate.

In hindsight, the context of the Kremlin's challenge also proved to be much greater than competing against other sovereign states, or even a coalition or an alliance of states. The global market place had left the interconnected information stage behind and was now in a digitally "integrated" one by 2030. Differentiated global production meshed with the demand of highly specific regional service economies, dispersed and self- nurturing around the globe. With a political, economically enhanced motivation to divest away from hydrocarbons at the heart of the internationally agreed Carbon Tax accords of 2025 --- a shift to alternative energy sources had contributed to a regionalized international energy infrastructure. Solar power in North Africa, the Mideast and arid environments in Asia, the Americas and Oceana championed by the World Bank, coupled with infrastructure investment, such as China's Belt and Rail initiative, contributed to this *international* regionalization.

Plausible conclusion…. Special Export Zone Kara

By 2040, though the hydrocarbon markets had much changed, they were still integral and the single greatest component of global energy supply. Relative proportion in that market had

diminished by one third --- but total contribution remained only slightly below 2015 levels. The maturing of economically integrated international regions had encouraged investment in capital intensive, geographically dedicated, parallel gas pipeline infrastructures --- lowering the projected impact of a global LNG market. However, Russia's central government augmented early investment in the necessary infrastructure allowed Sabetta LNG to compete from the SEZK with Australian and Qatar LNG. Likewise, Russian gas pipelines, such as Gazprom's Power of Siberia and other early strategic partnerships with China and India proved integral to Asian economic hubs. Global oil supply had kept pace with moderate demand. Advances in technique and methods had allowed the mainstay oil reserves in the Mideast to extend production levels. Demand relative to supply had again lifted prices to a projected incline able to justify the high cost of frontier oil, such as the Arctic offshore, on a limited basis---when an extractive infrastructure was already in place tied to a viable anchor field. This would prove to be the competitive advantage needed for the SEZK to incrementally expand to a portion of the geological potential of still the world's greatest undeveloped but recoverable oil reserves in the Russian Western Arctic. However, the domestic political impact of future incoming export hydrocarbon wealth would prove unable to reverse Russian social and economic devolution away from Moscow and the central government. The structures to redistribute power sharing and wealth with the indigenous peoples of the Arctic regions, or anywhere in Russia for political or social purpose --- had been atrophying for over 25-years. A ruling elite of very wealthy bureaucrat-oligarchs in Moscow would have significant funds available for new foreign policy adventures -- but unlikely on a transformative scale.

7.2.4 Arctic Shelf Ecological Park (ASEP)

2016-2025…Geopolitical shift

Fifteen years into the new millennium the Arctic was the unfortunate vanguard of a global transition to a warming climate. The observable physical impacts of this change were for a number of meteorological, oceanographic, geological and astronomical reasons accelerated in the high latitude maritime environment. There was strong scientific consensus that alterations to the earth's ecosystem by man, especially since the industrial revolution began the hydrocarbon era,

had contributed to a dramatic increase in CO2 emissions into the atmosphere. In Paris in 2015 an international effort to limit the use of fossil fuels reached a milestone of cooperation with China, India and representatives from much of the developing world agreeing to establish a cooperative, monitored process to limit CO2 emissions, and with it, dramatically reduce the use of hydrocarbons as the primary energy source for the global economy. There was much deserved optimism after this diplomatic achievement, but also realization that substantive reduction in greenhouse gas emissions only impacted the *rate* of adding to an ecosystem dynamic, that more likely than not, was already set on a warming oscillation. Moreover, success in these environmental objectives relied on a sustained international common purpose in a global context---with significant and unequal economic cost to *national* economies. By 2020, geopolitical trends showed no signs of new emerging human paradigm towering above and setting right the many known flaws of man's historical capacity to perfect a cooperative civilization.

The Russian Federation continued to slide into social-economic disequilibrium. Extractive exports, especially the most critical oil and gas sector, were locked at price levels below the minimal threshold for sustaining the social-political-economic-order. Demand for hydrocarbons had plateaued. There was no incentive for the investment risk needed to develop the frontier regions in the Arctic and very deep, distant offshore. The extractive industries, particularly oil and gas, relied even more heavily on a skilled core of Long Distant Commute (LDC) workers, with even less economic benefit spinning off to regional Arctic people. President Putin remained at the helm of a limited autocracy directing his aggressive foreign policy as a series of hybrid, set-piece moves coined in the world press as "contained-brinkmanship." In 2025, geopolitics far from the Arctic would again dominate its policy agenda as had Cold War posturing fifty years---and whaling fleets 400 years---before that. It would also bring change to the Kremlin.

Chinese naval and air power had systematically strengthened its capacity and could now legitimately threaten US naval supremacy in the Western Pacific as far as Guam and the Marianas. But it was a parallel maritime expansion into the South China Sea (SCS) that brought real conflict. With no obvious path to break out from a continuing economic slowdown, brought

on by the necessary restructure from an export driven---to a domestic driven economy. China's politburo continued to prioritize strategic resource objectives. A decade of military buildup in the SCS had persuaded even Vietnam to seek agreement on contested EEZ oil lease blocks, obliquely acquiescing to Chinese dominance. But a brazen Chinese naval exercise off the coast of the Philippine island of Palawan in the vicinity of the Balabac Strait brought to culmination a first order US-China military confrontation. Seemingly ignoring the declared exercise exclusion zone, the US flagged container ship M/V Maersk *King's Mountain* transited right into the live fire exercise. The Chinese aircraft carrier *Liauning* continued with an orchestrated air wing cruise missile attack even though forewarned of the M/V *King's Mountain's* presence. Whether compounded navigational errors, purposeful intent, bellicose leadership or bad luck --- *King Mountain* was hit by multiple missile strikes --- killing the captain and first mate on the bridge and injuring half of its small crew. Such incidents had been very rare among great powers even during the Cold War. With US forces now ordered to a strategic worldwide readiness posture of DEFCON 2 (war imminent), in perhaps one last *directed* move by the new, Putin-anointed, Russian president, a P8 Poseidon US maritime patrol aircraft on a routine mission in the Baltic Sea was shot out of the sky by a Russian S-400 surface to air missile. These events far from the Arctic, nonetheless, would prove a key influence on its future.

2026-2040… Unexpected cooperation

Six months from the edge of a nuclear confrontation---world diplomacy went to reset. There were a half a dozen more tactical engagements between Chinese and US forces in the few days that followed the missile strike on the *M/V King Mountain*, but no ships were lost and a war was averted. Surprisingly, the Western European Union (WEU) emerged from NATO's shadow and proved to be the key security structure capable of mediating a US-Chinese de-escalation of tensions. Sharing a moment together at the precipice---Chinese and US leaders---as did US and Soviet leaders following the 1962 Cuban missile crisis---worked to find mechanisms to avoid a repetition. But for the Kremlin, there was no soft landing. The US–Chinese confrontation had proved a geopolitical threshold beyond the reach of an opportunistic third party. After having faced a real threat to national survival, neither Beijing nor Washington looked to Moscow. China, self-assured in its stand-off with the last superpower, rapidly reached agreement with a pragmatic Taiwanese leadership for political integration of a new autonomous Taiwanese region

--- with US acquiescence --- and now turned inward for dramatic domestic structural and economic reform. An EU confident in the wake of it pivotal mediation in the SCS confrontation was back on track to complete a monetary and true "political" union. It also now had the diplomatic solidarity and momentum needed for an EU alternative energy and carbon emission vision to lead the world in a transition away from hydrocarbons. The EU led by example and committed the heavy capital investment necessary for marine current turbines and a new decentralized electric grid maximizing efficiency of dispersed wind and solar energy sources. The global crude oil supply proved capable of meeting modest increases in demand primarily with targeted investment in enhanced recovery techniques in the massive operating fields in Saudi Arabia and its regional neighbors. Costly frontier projects in the Arctic offshore were put on hold, though limited production from the more accessible areas of the Russian Barents and Southern Kara Sea, established in the 2020s with subsidized funding from the central government continued within marginal profit-loss parameters.

Russian foreign policy had gambled the previous two decades on exploiting the seams in a steadily fracturing world order --- and lost. The central government had been unable to sustain economic progress with the erosion of hydrocarbon export earnings, but nonetheless, had persevered with strong populist support. After the 2025 China-US confrontation and the diplomatic humiliation in its aftermath, new leadership was engineered for the Kremlin by security and business elite. Transitory bureaucratic restructuring and a minor liberalization of the media were attempted, but the priority was on reintegration into an international political and economic system which had left Russia behind. By 2030 the Federation re-emerged marginally more transparent, and less corrupt in the international business sector, the crux of the reform effort, but remained burdened by even slower growth than its competitors. But in the Arctic, geography still afforded an opportunity to engage internationally from a position of relative strength.

Russia returned to more cooperative engagement in forums --- but especially in what had become for over a decade, a dormant Arctic Council. It took ownership in building consensus in the forum for a series of measures to codify regional standards on extractive industries and shipping. Under Russian Chairmanship in 2032, a breakthrough consensus was reached within

the AC to support an updated International Maritime Organization (IMO) Polar Code, which included long needed *integrated* enforcement procedures that included a centralized multinational Arctic Environmental Enforcement and Response Center (AEERC) to be based on Russian soil with international funding. A key provision called for shared planning and operational exchanges among the coast guards and enforcement agencies of all eight Arctic permanent member states. Awareness of the environmental effects of climate change had become the global norm, and these effects were especially apparent in the Arctic. Activism with state support had proved highly effective in shutting down marginally viable oil and gas projects in the Arctic Norwegian offshore, but less so in Russia which continued to suffer population and social decline. Oil and gas rents, had historically provided little return to the Indigenous Peoples or regional governments, even less so in the fiscally restrained budgets of the previous 20 years. In 2034 a joint presentation by the Russian president and Norwegian prime minister announced the creation of the Arctic Shelf Ecological Park (ASEP), which included the Norwegian, Barents and Kara Sea EEZ outside a defined industrial coastal zone.

Conclusion…the protocol that worked

Future hydrocarbon exploration was limited to that industrial zone that included the modestly refurbished infrastructure of the Northern Sea Route (NSR) and the oil and gas production platforms put in place two decades earlier. The ASEP agreement was not binding on either nation, but nonetheless was seen as highly significant advancement in international environmental soft law. The park, it was also hoped, might add to an international tourism revenue stream for the impoverished Russian coastal region. Few in the first tumultuous decade after the Paris Accord of 2015 maintained optimism that the 2040 carbon reduction goals could be met at the agreed pace. But the unforeseen impact of geopolitical shifts; the fortuitous effects of low growth and manageable energy demand; and technological advancements and efficiencies created the necessary synergy. Even fewer foresaw that these goals would be a Russian policy objective.

7.3 Findings of narrative exercise

The preceding scenarios were initially framed with the key drivers and uncertainties derived from the more broadly scoped Arctic offshore hydrocarbon development UAF

workshop. The key drivers were then assessed and refined in a deductive process which produced four different quadrants from the crossing of a high vs a low hydrocarbon demand future with a geopolitically stable vs unstable geopolitical environment (Chapter 6). A significant and purposeful component in the crafting of the four alternatives for Kara Sea hydrocarbon alternative futures and implications were the more regionally and technically specific findings from this dissertation's survey-interview of experts (Chapter 5). Table 7.2 which follows highlights and compares the core concepts underlying the four scenarios.

Table 7.2 Scenario comparison table

	I. Western Arctic Maritime Union	II. Kara Industrial Security Region	III. Special Export Zone Kara	IV. Arctic Shelf Ecological Park
Framing Uncertainties				
High Concept	•High hydrocarbon demand and cooperative internal governance allows for a competitive edge for the Western Arctic offshore region. •Markets have regionally clustered across borders allowing shared access to capital and technology.	•High hydrocarbon demand drives unilateral development strategies. •Russian projects are massive but not as successful without Western industry engagement. • Nonetheless highly active with other partners.	•Low hydrocarbon demand fosters market driven decentralized strategies. •Poorly coordinated Arctic energy projects rely on foreign funds with minimal transparency. •Market incentive for complex Arctic projects is low but development is nonetheless sustained in Russia.	•Low demand and international political consensus on high ecological standards curtail most extractive projects in Russian Arctic. •Very limited Arctic hydrocarbon ventures but in compliance with high international social norms and standards.
***Key drivers* of Change**	•Economic advantage to large scale strategic investment in anchor fields in the Southern Kara. •Globalization is a catalyst to high technology and capital. •Russian political reform driven by market necessity.	•Sovereignty reigns supreme. •Russia leads pack to go it alone if necessary on large extractive projects in the Arctic. •International social economic system drifts to a zero-sum game at the macro level.	•Russia continues supplying a flat lined hydrocarbon energy demand with exploitive extractive practices.	•Alternative energy proves viable for a slowed global economy. •Lack of economic capacity compels a Russian shift to more transparent governance and regulatory standards.
Primary Implications	•Arctic hydrocarbon projects are competitive. •Russia more integrated into a global economic and political system. •Alternative energy is more significant but does not dominate the energy market. •Russian policy choices in concert with agreed international norms.	•Globally hydrocarbon market practices are regionalized along sovereign lines. •High ecological and social standards in some advanced countries are dissipated globally by fractured geopolitical order. •Russian policy is driven by unilateral great power ambitions	•Significant risk in Russian Arctic for ecological damage. •Poor likelihood of reducing rise in atmospheric temperature to 2 degrees Celsius by 2040. •Russia policy focuses on competing for wealth in disparate geographic regions.	•International environmental ambitions are achieved for protection of the region---but there are few funds to adequately address social needs. •Russian policy adheres to international legal norms---but are lacking in control and executive capacity.

Chapter 8 Conclusions

8.0 Overview

The outcomes of this dissertation's research and survey-interview findings into Kara Sea offshore hydrocarbon development are grouped below into major themes and their sub-themes. A discussion of the key drivers and their interplay (in the workshop, scenario development and narrative creation effort) has been integrated into the discussion. The complexity of the drivers and their collective interaction and adaptation were explored using the scenario narratives (accentuated, was the underlying influence of global hydrocarbon demand and stability in the international system as integral, and indicative, of overall success or failure for Russia to achieve its hydrocarbon development objectives in the Kara Sea).

8.1 Outcomes

8.1.1 The *global* crude oil market is a highly significant driver

The global crude oil market is the first or second most important factor (along with geopolitical influences) driving hydrocarbon development in the Kara Sea; and its future dynamics, at least until mid-century, are uncertain. It is the Kara Sea's offshore traditional *crude oil* potential that is the necessary catalyst for the very high capital investment, over decades, that is required to bring the offshore Arctic region to production. There are ample natural gas fields ashore that could be exploited, and are being developed, at less cost, that can sustain Russia's investment in the Sabetta LNG Project and Port for many years. Offshore drilling in the Arctic, such as at the University-1 Prospect at the limits of fixed to seabed rigs (approximately 100-meters depth), are on a magnitude of eight times as costly as drilling ashore. The LNG market is growing rapidly, but the biggest projected boom in export capacity this decade is in Southwest Asia and Australia, not Russia. Standalone offshore gas projects, in harsh environments like the Kara Sea, are not likely to be market-competitive for many years. Gazprom's Shtokman JV project with multiple and changing IOC partners in the more benign central Barents Sea to the immediate west, continues to be put on hold, as the market just does not support the investment necessary. Therefore, *global* market demand for crude oil, but not gas (NG or LNG) will drive offshore development in the Kara Sea. Much of the hydrocarbon offshore assessments for Russia's EEZ have a high gas to oil ratio. The southern Kara Sea lease area offers a regionally

optimal potential *oil* ratio (supported by the preliminary announced results from the 2015 exploratory drilling). Bringing the southern Kara Sea into offshore production is also intended to serve as a technological and infrastructure bridge to the more challenging northern Kara and Laptev Seas.

Clearly, the market cost of oil very much drives investment in exploring and producing it. But future prices are volatile, influenced by investment forces not solely isolatable to supply and demand. Forecasting prices is a near and perhaps mid-term (5-10 years) gamble for profit margins for the O&G industry and highly dependent hydrocarbon export states (such as Russia). Demand and its relationship to supply however for hydrocarbons, especially oil, are used to anchor strategic investment decisions (20-30 years) by IOCs such as ExxonMobil and Shell. In essence, the massive long-term strategic investments are wagered based on an assessment of how much supply to bring online to meet *global* demand (not a forecast of price 20 years into the future). The prevailing O&G industry view is that alternative energy and conservation efforts, most affordable in the relatively wealthy states, will have difficulty in suppressing demand, driven by still-developing populations, to achieve a standard of living commensurate with those same wealthier states. Therefore, hydrocarbons will remain the optimal energy choice based on the underlying principal of Energy Return on Investment (EROI) until mid-century.

The four future scenario narratives that were created (Chapter 7) were intended to explore Russia's Kara Sea ambitions by embracing the complexity of future hydrocarbon demand, geopolitical influences, and their interplay with other key drivers within an Adaptive Complex System. What was clear in all four plausible futures is that for offshore development in the Kara Sea to proceed, significant scale, and increasing global hydrocarbon demand are required. But it also requires, especially for Russia, an international geopolitical environment that is cooperative and stable for greatest possibility of success. Optimal conditions were demonstrated by the "Western Arctic Maritime Union (WAMU)," where both these critical uncertainties were at high favorable thresholds. Market demand drove development effort into frontier regions like the Arctic offshore, and "stable" geopolitical conditions allowed for specific O&G technology, management skill and capital investment to flow freely across borders. The Kara Sea could compete with other hydrocarbon regions around the world because of

cooperative international integration of infrastructure anchored on mega-projects in the highly productive regions of the Norwegian and Russian Western Arctic littoral region. Critical was sustained (15-20 years) investment that could withstand the ups and downs of transient energy price fluctuations; at times assisted by state funds. However, Russian development objectives, even with high global demand but at low levels of international cooperation, could achieve some, but significantly less unilaterally driven success, as demonstrated by "Special Export Zone Kara (SEZK)." In the two scenarios that highlight low demand and both a cooperative and uncooperative geopolitical climate for Russia, little progress is made in Kara Sea development. In the former, international environmental concerns outweigh the very marginal potential for marketable development. In the latter case, an uncooperative international environment combined with a reduced Russian resource exploitation capacity, forces redirection to less capital intensive and complex projects ashore.

8.1.2 Impact of punitive sanctions

Russia has and can be expected to continue to attempt to mitigate the impact of sanctions on its hydrocarbon industry, as well as in all other aspects. Already evident has been an attempt to acquire necessary capital investment, technology and managerial offshore expertise elsewhere. The downward shift in the price of oil, largely independent but coincident in time (mid-2014) with the implementation of Western sanctions, has also hindered success in pursuing new investors in the Kara Sea as well as for other large new projects (though ashore Sabetta LNG continues forward with some significant, but minority share augmentation from new funds of Chinese origin). Now a necessity for Russia, a shift of IOC partners would be complex and difficult even without the current sanction regime in the short to mid-term (5-10 years). Expertise in technology and management for very large offshore projects is key; and that offshore expertise in the Arctic is shared by very few. Corporations big enough and competent enough to work offshore in the Arctic will not prematurely risk renewed sanctions until they are sure they will not be reinstated. It is unlikely that suitable alternative partners for offshore oil exploratory drilling and initial development in the Kara Sea lease areas will be found within a decade or longer if sanctions remain firm and in the present form. Overtime, that field of capable expertise outside the existing dominant IOCs might develop as well as alternative market and supporting structures, particularly in Asia; if hydrocarbon market demand also makes a

significant and sustained upward recovery (this was already evident with gas contracts even before sanctions---but slowed with the global market).

In the scenario "Kara Industrial Security Region (KISR)," (high demand but low geopolitical stability and cooperation) Russia breaks out of the restrictive sanction regime not through foreign policy compromise or improved relations with the US and the West, but by capitalizing on internal inconsistencies within Western nations and "their" institutions of global order. By partnering with China and other states the Kara Sea offshore reserves are slowly developed (without IOC partnerships) as a "national strategic investment" not solely correlated to commodity markets (reminiscent of the Soviet development of Western Siberia in the 1960s), with just the pace and extent necessary to progress through an initial decade of only modest or questionable marketability, to be in place when global demand begins to recover. Elsewhere around the world's frontier hydrocarbon regions, new investment has much stagnated, and the Russian Federation is in a position to capitalize two decades later. The most relevant scenario to characterize a sustained continuance of present conditions (characterized by low relative demand and low international stability), "Special Export Zone Kara (SEZK)," the Russian Federation returns even further to a "USSR light" hydrocarbon development policy. The Arctic offshore, and specifically the Kara Sea are also developed as "national" strategic priorities to an even greater extent than in the high demand "Kara Industrial Security Region (KISR)" future. The objective becomes, unlike the present day, development outside "global commodity markets." By brute effort and an accepted sacrifice of central government social, educational and institutional investment, offshore fields produce oil in the Kara Sea, destined for what develops over time to be regional markets. Like the USSR of old, this singularity of central state priority, though without the ideological rigor, eventually produces marketable oil but hollows and weakens the central institutions of the Russian Federation. The Kara Sea oil rents arrive too late to save the integrity of the state, and profits are distributed in what develops by near century, into a Western Arctic regional fiefdom.

8.1.3 Will IOCs return? Are they necessary for Russian strategic objectives?

The largest of the IOCs, such as ExxonMobil, should have no problem if sanctions are lifted returning to Russian projects; smaller enterprises and O&G service companies will likely

have greater difficulty. The great capacities the IOCs bring to the Arctic, are not necessarily as needed elsewhere in the world by NOCs where conditions are not as severe or demanding. Most ongoing exploration and production outside the Arctic and sub-Arctic does not need the most advanced Western technology. The IOCs need *new* reserves for their own strategic futures. Long-term scarcity of *new fields* not already under a state or NOC's control likely makes it worth the risk of doing business, again, with President Putin's Kremlin or whatever Russian leadership might be in the future if the market supports development and if the economics of the business arrangements add up. What could be a showstopper for international O&G involvement in the Kara Sea, but not necessarily for Russia, are the still unknown true extent of the oil vs gas reserves as well as their density. There is a high degree of certainty the hydrocarbon reserves of the region truly are vast; but it will take a large magnitude of "oil" that is markedly extractive to push IOC engagement to risk development into the offshore region. Success in one exploratory well does not "anchor" necessarily or prove the massive investment in infrastructure to be a worthwhile investment. Prudhoe Bay for example, which drove the O&G industry to take high risk on constructing the Trans Alaska Pipeline System was anchored by Prudhoe Bay, which was an "ashore" field of truly huge and dense magnitude that needed few satellite wells to extract (initially estimated at ten times the announced findings of West Alpha's 2015 exploratory drilling (Miller 2010)), though in the Kara Sea many other fields are anticipated but not proven in the vicinity. But the more wells necessary, especially offshore, correlates to much higher expenses to extract.

As the Russians well understand themselves, the scale of investment and expertise necessary to bring into production the offshore lease areas in the Kara Sea, to be followed later in the century by development of even more demanding regions to the north and the Laptev Sea in the east, will require IOC engagement to bring into production; at least within the next decade and a half. Distinct from investment in long haul pipelines ashore and the Sabatta LNG Port and Project, there are no indications Chinese firms or NOCs have either the current capacity, or the ambition, to replicate ExxonMobil's strategic offshore partnership with Rosneft. Nor are there any other capable partners not honoring the sanctions regime.

In the high hydrocarbon demand – stable geopolitical system scenario, the Western Arctic Maritime Union (WAMU), offshore Arctic regions such as the Kara Sea re-emerged as competitive in the global market. Nonetheless, the complexity, high capital demands of these projects, but also significantly the strategic need to rapidly reengage with suspended projects drove Russia to renewed engagement with the most capable of the IOCs, such as its pre-sanction partner ExxonMobil. In an unstable international geopolitical system with a nonetheless high market demand for hydrocarbons, as demonstrated in the Kara Sea Industrial Security Region (KISR), alternatives for Western IOCs were found within a decade, but they could not replicate the scale and market success achieved by re-engagement with Western IOCs.

8.1.4 Significance of Kara Sea success on Russia's capacity as a state

Russia's successful development of its Arctic hydrocarbon resources is strategically vital to Russia which remains extraordinarily dependent, for a traditional major state, on extractive exports, especially oil and gas, to fund basic central government. The trend since the Medvedev presidency has been a regression rather than a progression in diversifying the Russian economy away from resource dependence and continuing symptoms of the "Dutch disease." The Kara Sea holds special importance in this context, not only for the magnitude of its resources, but as a threshold crossing indicator for Russia's capacity to harness the industrial might necessary to secure its economic future. For the current regime, that also implies the continuation of a resurgent Eurasian "great power." Russia will still matter; if they fail, but will have to further rely on formal or informal alliances with other states and have less capacity for independent policy action. Failure to advance oil production into frontier offshore areas like the Kara Sea, will very likely leave Russia with less capacity for unilateral foreign policy action in 2040 than they enjoyed in 2014.

All four scenario futures developed for this dissertation are indicative of the central role hydrocarbon extractive expansion into new frontier regions, and the Kara Sea specifically, is and will remain, for the stability of the Russian Federation. High demand (and a correlated high price) of Russian hydrocarbon exports, sustained by progressive development of new reserves in the Arctic and especially its offshore regions within a cooperative international environment, the "Western Arctic Maritime Union (WAMU)" future, by definition, implies a Russian central

government interacting in a global economic international order. The WAMU future offers the highest potential for Kara Sea development, utilizing the best of IOC capacities in project management, drilling technology and response to environmental mishaps or accidents. Capital flows freely across borders and is driven by international market dynamics. But it is not the win – win future for all that it implies. Russian Federation leadership may not, as it does not presently appear, value international cooperation at any cost, even if it is critical for its economic future, when it threatens other policy objectives of the central leadership, as demonstrated by the policy choices taken in 2014 in Crimea and the Ukraine. Both of the low geopolitical stability scenarios (KISR and SEZK), whether in a high or low hydrocarbon demand global market, indicate a reduced, but nonetheless existent capacity for the Russians to persevere over the long term with more modest development objectives; but neither of these scenarios provide a return to the full vision of their 2013 Arctic strategy.

8.1.5 Circumpolar impacts: environmental sound development?

International cooperation is a driver for Russia's success in its offshore development objectives and was recognized as such in their strategic documents well before the impact of sanctions demonstrated. Russia can ignore world opinion, but not its consequences. However, that leverage should not be overstated. The current sanction regime targets the Russian oil and gas sector as a means to induce different Russian foreign policy choices for Crimea and the Ukraine; not for environmental good stewardship. Environmental and safety standards have probably improved in the Russian Arctic offshore regions, as elsewhere in Russia, with the influence of cooperative partnerships with Western IOCs. Standards could lapse significantly during period of sanctions or lack of interaction. Much of the core of Norway's Arctic strategy is to engage, specifically with its Russian neighbor, to influence common best practices and standards for the offshore O&G industry. Cooperation on oil spill response plans, as well as search and rescue has been and remains an objective of all the Arctic states, to include the US and Russia, and has resulted in recent agreements. Nonetheless, there is a historical legacy for unilateral Russian O&G development to not prioritize high environmental standards, even when legally mandated.

The narrative future "Arctic Shelf Ecological Park (ASEP) highlights a Kara Sea in a low demand, but highly cooperative internationally integrated system which results in "park" status for both the highly coveted offshore hydrocarbon reserves in the Barents and Kara Seas. This development derives from a low demand market where a weakened Russian state looks to engagement for funding support. However, such a future also envisions few funds available for social and educational investment in the region, as well as for legal enforcement of environmental and maritime standards in the ASEP itself

8.1.6 Arctic and strategic policy implications

Russia's current Arctic policy is very much a reflection of its President's; an enabling objective to ensure continued Russian domestic control and prestige on the world stage. But though Kremlin policy choices may echo an earlier time of balance of power realism, there is also an awareness in those policies of global market and political interdependence (even if undesired). Strategic realignment outside the Western order looks to building new foundations with partners, even with more powerful states then themselves, like China, as well as "rogue states;" but not to complete isolation. The military "build up" in the Russian Arctic (distinct from the more aggressive military-strategic operational tempo the last decade) "could" be seen as a constructive positive and practical development, as it is generally focused on "soft" security that improves Russian capacity to respond to safety and environmental mishaps, as well as legal sovereignty; all for the good of sound Arctic stewardship. However, when combined with aggressive rhetoric from the Kremlin and blunt geopolitical challenges elsewhere in the world, it does not enhance a benign international perception. Russian leadership has retained a measure from its Soviet legacy, of approaching economic enterprises, especially massive industrial ones, differently than the West. Investment decisions based on questionable economic viability to achieve a strategic policy objective are routine. They can also evolve into being economically sound in the long term as well e.g. the development of Western Siberia in the 1960s.

The improbable or unforeseen does, can, and well may happen; but by definition are also improbable. Events to come that hugely impact human society periodically have occurred over the last several thousand years, even in the last century. In terms of the likelihood of development of the Kara Sea offshore hydrocarbon reserves, any catastrophic event that impacts

energy demand (economic or human health collapse of high magnitude, wars approaching the scale of the ones 75 and 100 years ago, or driven by any other reason) will negatively impact expansion of hydrocarbon into the Russian offshore regions as they would to similar energy mega-projects around the world. A great economic and social breakthrough energizing growth and prosperity in the very poorest and heavily populated regions of the world would have an inverse effect. Alternatives to hydrocarbons that can provide the energy to meet global economic demand before *mid-century* may develop. But they are not now discernable in magnitude and *cost* that would support a "global" transition to a standard of living known in the most advanced regions.

8.2 Final assessment

If the Russians can achieve their objectives in the Kara Sea they should also be capable of success in other demanding frontier regions and on a path to meeting their strategic energy goals. It is unlikely any other effort at hydrocarbon extraction would have the same "sustained" significance for Russia's economy, and thereby the stability and capacity of the central state, for the rest of this century. But they are off to a poor start. Geopolitical events blocking collaboration with Western IOCs and market conditions have probably set the clock back a decade. Were they to resume exploratory drilling next year, 2017 (not planned and highly unlikely), it would be well into the 2030s before the Kara Sea would see full production.

Does a case study approach to Kara Sea offshore hydrocarbon development foretell or assist in projecting overall Russian offshore Arctic hydrocarbon development? The results of the research indicate the model is viable; but does not necessarily drive or indicate future development elsewhere in Russia (outside the broader offshore region in proximity). The scenarios demonstrate the complexity of the drivers of hydrocarbon extraction in Russia's Kara Sea; and that they can adapt and interact in a non-linear manner.

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Appendix A

UNIVERSITY OF ALASKA FAIRBANKS

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Institutional Review Board

909 N Koyukuk Dr. Suite 212, P.O. Box 757270, Fairbanks, Alaska 99775-7270

March 18, 2015

To:	Douglas Reynolds, PhD Principal Investigator
From:	University of Alaska Fairbanks IRB
Re:	[730749-1] Survey: Russian capacity to develop its offshore oil reserves in the Kara Sea

Thank you for submitting the New Project referenced below. The submission was handled by Exempt Review. The Office of Research Integrity has determined that the proposed research qualifies for exemption from the requirements of 45 CFR 46. This exemption does not waive the researchers' responsibility to adhere to basic ethical principles for the responsible conduct of research and discipline specific professional standards.

Title:	Survey: Russian capacity to develop its offshore oil reserves in the Kara Sea
Received:	March 12, 2015
Exemption Category:	2
Effective Date:	March 18, 2015

This action is included on the April 1, 2015 IRB Agenda.

Prior to making substantive changes to the scope of research, research tools, or personnel involved on the project, please contact the Office of Research Integrity to determine whether or not additional review is required. Additional review is not required for small editorial changes to improve the clarity or readability of the research tools or other documents.

Your participation in a non-attribution survey of experts examining **Russian *capacity* to develop its offshore oil reserves in the Kara Sea** would be most appreciated. This survey is part of a larger dissertation project. This survey should take as little as 10 minutes, though as much follow up and detail as you could accommodate would be welcome. *The survey can be sent via email to be completed at leisure, returned in person, or can be conducted over the phone at a later time at participant discretion. If a phone call, email or direct interview is used to complete or for follow up questions (at the willingness of participants) identifying criteria will not be included with the data, tabulations or reporting. A copy of the findings will be provided to all participants who so desire.*

Jon A. Skinner

Commander, US Navy, (Ret)

MA and MS (Strategic Planning and Intelligence)

Naval Postgraduate School, Monterey, CA

University of Alaska Fairbanks

Interdisciplinary PhD student: Arctic Geography and Policy

jskinne6@alaska.edu 907-441-9186

*** If you have questions or concerns about your rights as a research participant, you can contact the UAF Office of Research Integrity at 474-7800 (Fairbanks area) or 1-866-876-7800 (toll-free outside the Fairbanks area) or uaf-irb@alaska.edu.**

Survey context: The size of the Kara Sea hydrocarbon fields is arguably great enough to impact the progression of the Russian economy. They likely represent the largest unexploited traditional crude oil reserves remaining. But there are undercurrents of skepticism that Russia may not achieve production at the scale envisioned. The technological sophistication, level of cooperation and integration needed between Russian and foreign oil corporations as well as capital investment remains critical. This survey will assist in identifying the underlying predetermined elements, critical uncertainties and key drivers.

Please indicate which response you feel best answers the question. Further comment or insight is encouraged.

(1-4)Experience profile and background questions (non-attributive)

1. Would you characterize your expertise and insight into hydrocarbon exploration and production in Arctic offshore regions as:

____Extensive and specific to the offshore oil and gas industry in the Arctic

____Within broad professional scope but not necessarily Arctic focused

____Solid grounding in Arctic issues but not necessarily specific to hydrocarbon extraction

____Other and/ or further comment:

2. Would you characterize your experience in working with Russian firms in the oil and gas industry or regulatory authorities as:

____Extensive

____Somewhat tertiary

____Little experience

____Other/and or further comment:

3. Would you characterize your expertise and insight into hydrocarbon extraction efforts in the Kara Sea as:

____Specific and extensive for that region

____Well informed, but not in high detail for that specific region

____Other/and or further comment:

4. Do you have previous experiencing in partnering or otherwise had a working relationship with Russian oil and gas corporations or supporting service companies in Arctic offshore areas?

____Yes, significant engagement

____Yes, but tertiary or to a minor extent

____No

____Other and/or further comment

Please indicate which response(s) you feel best answers the question. *More than one answer may be appropriate* in this section (5-14). Further comment or insight is also encouraged.

(5-15) Substantive judgment questions (non-attributive)

5. Among the *International Oil Companies (IOCs)*, such as ExxonMobil, which strengths would you consider best complement Russian corporations such as Rosneft, in joint venture efforts in Arctic offshore regions:

____High-Technology

____Managerial expertise

____Investment capital

____Other and/or further comment:

6. Among the *National Oil Companies (NOCs*), such as only one example, Petroleos, do you see adequate strengths, which could replicate IOC participation and assistance to Russian hydrocarbon objectives in the Arctic offshore regions?

____Yes

____No

____Yes, but to a limited extent

____Other and/or further comment:

7. Do you feel the impact of international sanctions on cooperation with Russian corporations in Arctic offshore hydrocarbon projects will have a continued significant impact on suspended, curtailed or new cooperation *even if they were lifted?*

____Yes, in the short term (two years)

____Yes in the mid-term (two to five years)

____Yes, likely to have an impact for a decade or more

____No

____Other and/or further comment

8. Do you feel hydrocarbon extraction governance structures and compliance with international safety and environmental standards in Russian Arctic offshore regions will be impacted by a curtailment/reduction in engagement with IOC partners?

____Yes, significantly

____No, not significantly

____Other and/or further comment

9. Is the current drop in the price of oil inhibiting strategic (long term) investment in Arctic offshore oil and gas exploration?

____Yes

____No

____Yes, and to a greater degree in Russia than other Arctic offshore regions

____Other and/or further comment

10. If legal restrictions on working with Russian oil and gas enterprises were lifted, how confident are you with partnering with Russian joint ventures compared to other potentials on the globe?

____Highly confident and comfortable

____Somewhat reserved

____Not confident

____Other and/or further comment

11. How much influence has your answer to question (10.) been impacted by the series of sanctions targeting Russia begun in 2014?

____Significantly influenced

____Not been a significant influence

____Other and/or further comment

12. Do you believe the offshore Arctic hydrocarbon regions are the most quantifiably significant undiscovered and economically recoverable energy reserves within the next 30 years?

____Yes

____No

____Other and/or further comment

13. What other source or change in market dynamics will reduce demand for the development of offshore Arctic hydrocarbons?

____Dramatic reduction in overall energy demand through conservation efforts or otherwise

____Rapid rise in the macro-economic viability of alternative energy sources (other than hydrocarbons)

____Significant change in the macro-economic viability of non-traditional hydrocarbon supply

____Other and/or further comment

14. Do you feel the greatest obstacle to developing Russia's offshore hydrocarbons is:

____Geopolitical (such as current sanctions, but also in a broader perspective)

____Technological

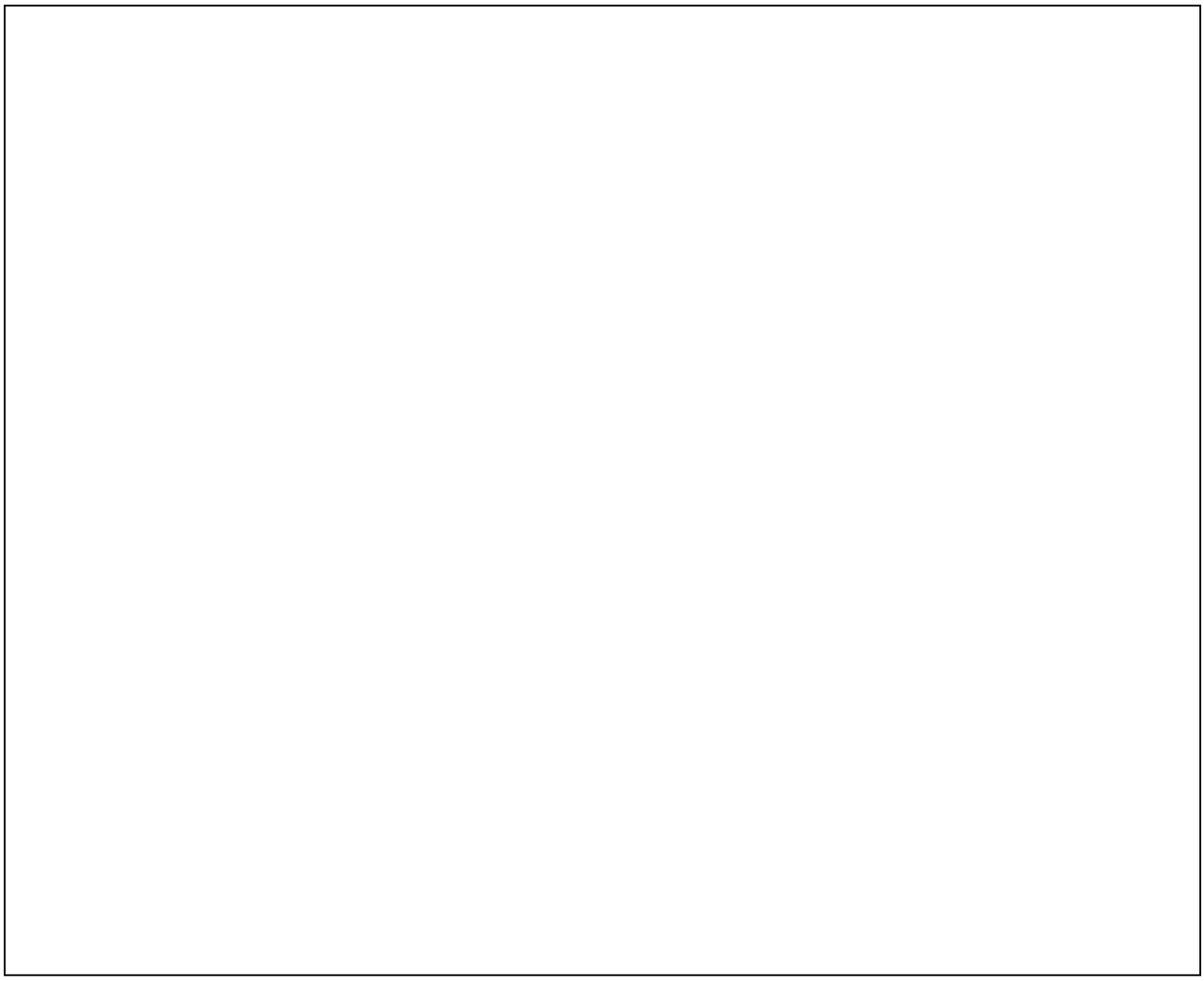
____Economic viability (compared to alternative sources)

____Competiveness of other hydrocarbon investment opportunities

____Uncertainty in forecasting the Arctic offshore environment (patterns of climate change)

____Other and/or further comment

15. Please feel free to provide any additional insight that you feel might contribute to this study and/or suggested resources (e.g. studies, analysis, documents released to the public).



Appendix B

List of Participants

Workshop Circumpolar Offshore Development 2040 – 27 Sep 2015

University of Alaska Fairbanks

Members (31)	**University of Alaska Fairbanks**
Mia Bennett	University of California Los Angeles (UCLA)
Rasmus Gjedsso Bertelsen	Arctic University of Norway (UIT)
*Lawson Brigham	University of Alaska Fairbanks
Terrence Cole	University of Alaska Fairbanks
Bjorn Dahlback	Swedish Polar Research Institute
Ted Eschenbach	TGE Consulting
Gail Fondahl	University of Northern British Columbia
Bernard Funston	Arctic Council Sustainable Development Working Group
James Gamble	Aleut International Association
Allyssia Garcia	University of Alaska Fairbanks
Jessica Garron	University of Alaska Fairbanks - Alaska Satellite Facility
Gunhild Hoogensen Gjorv	Arctic University of Norway (UIT)
Kristin Gjorv	Arctic University of Norway (UIT)
Piotr Gracysk	Arctic University of Norway (UIT)
Jess Gunblatt	University of Alaska Fairbanks
Anne Merrild Hansen	Danish Centre for Environmental Assessment - Aalborg
Lee Huskey	University of Alaska Anchorage
Aytalina Ivanova	North Eastern Federal University (Yakutia)
Noor Johnson	Brown University – Smithsonian Institute
Jenny Jones	University of Alaska Fairbanks
Michael Kingston	DWF - International Union of Marine Insurance
Marc Lanteigne	Norwegian Institute of International Affairs (NUPI)
Natalia Loukacheva	University of Northern British Columbia
Jerome Montague	Alaskan Command
Slavomir Raszewski	Kings's College London
Douglas Reynolds	University of Alaska Fairbanks
Jessica Shadian	Aarhus Institute of Advanced Studies - Bill Graham Centre
**Jon Skinner	University of Alaska Fairbanks
Florian Stammler	University of Lapland - Arctic Centre
Maria Tysiachniouk	Wageningen University
Pips Veazey	University of Alaska Fairbanks - NSF EPSCoR
*Participated and also facilitated the discussion.	
**Participated as well as organized the work shop as part of dissertation research.	

Appendix C

Record of copyright permissions

Figure 2.1 Global Arctic oil and gas by country

Figure 2.2 Onshore vs offshore potential by country

Figure 2.3 Site of South Kara Sea drilling 2014

Figure 2.6 Comparative Arctic offshore ice conditions

Permission for use of graphics above granted by National Petroleum Council July 11, 2016

***

Jon,

Attached are the graphics that you requested from the "Arctic Potential" NPC report.

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Should you have any further questions, please contact NPC Editor Barbara Allen at ballen@npc.org.

Sincerely,
Arthur Cadeaux
Art Director/Webmaster
National Petroleum Council

F*igure 2.4 Estimates of undiscovered oil and gas north of the Arctic Circle*

***

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Figure 2.5 Kara Sea 2014 drilling

***

Permission granted.

Thanks,

Chris

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From: Jon Skinner [mailto:jskinne6@alaska.edu]
Sent: Monday, June 27, 2016 5:11 PM
To: Chris Smith
Cc: Tayvis Dunnahoe
Subject: Use of image

Chris, request permission via email to use below image, posted from your online journal, within an academic dissertation with the University of Alaska. Of course I will credit source....vr Jon Skinner 907 441 9186

Figure 3.1 Transportation cost comparison

***

Dear Jon,

The slide you sent me is a simplified version of a slide I have often used in presentations. You certainly have my permission to use it, but it is now it is now badly out of date. The most recent updating (with the more detailed information I usually include) is based on 2012 data. I am enclosing a PowerPoint version. If you wanted to use that, I could find the presentation that includes it and send it to you. If you wanted to simplify the slide, I could send you the data for the lines you wanted to include.

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Jim Jensen

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Subject: Copyright request